DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

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FACULTY OF COMPUTING SCIENCES AND ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

Master of Computer Applications (M.C.A)

MCA CURRICULUM AND SYLLABUS
(SEMESTER: I, II, III, IV)

REGULATION 2023

(Applicable to the students admitted from the academic year 2023-2024 onwards)

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University Vision and Mission

Vision

To be a University of global dynamism with excellence in knowledge and innovation ensuring social responsibility for creating an egalitarian society.

Mission

UM1: Offering well balanced programmes with scholarly faculty and state-of-art facilities to impart high level of knowledge.

UM2: Providing student - centered education and foster their growth in critical thinking, creativity, entrepreneurship, problem solving and collaborative work.

UM3: Involving progressive and meaningful research with concern for sustainable development.

UM4: Enabling the students to acquire the skills for global competencies.

UM5: Inculcating Universal values, Self respect, Gender equality, Dignity and Ethics.

Department Vision and Mission

Vision:

To be a leading, contemporary, innovative Computer Science and Applications department in inculcating professional competencies in the field of Computing and related interdisciplinary technologies to achieve academic excellence and to facilitate research activities as a timely response to dynamic needs and challenges of industry and society.

Mission:

DM1: Imparting quality education in the field of Computing Sciences and Applications and generate successful computing professional

DM2: Encouraging students to collaborate with industry environment and analyse the real world problems culminating in efficient solutions.

DM3: Transforming students into computing professionals and entrepreneurs by imparting quality training and hands on experience with latest tools and technologies.

DM4: Promoting activities in creating applications in emerging areas of computing technologies and applications in order to serve the needs of research, industry, society and scientific community.

DM5: Inculcating value based and ethical commitment for bringing out successful professionals.

MEMBERS OF THE BOARD OF STUDIES

S.No	Name of the Member	Designation and Address
1.	Dr.J.Jeyachidra	Professor and Dean FCSE, Faculty of Computing Sciences and Engineering, Periyar Maniammai Institute of Science & Technology, Vallam.
2.	Dr.D.Ruby BoS Chairman	Associate Professor and Head, Department of Computer Science and Applications, Periyar Maniammai Institute of Science & Technology, Vallam.
3.	Dr.S.Nickolas **(Academic Expert)**	Professor, Department of Computer Applications, NIT, Tiruchirappalli.
4.	Mr.J.Sengathir **(Industry Expert)**	Manager,Enterprise Resource Planning,BHEL Trichy – 620 014
5.	Dr.V.Adithya Pothan Raj **(Industry Expert)** **Online Mode**	Associate Operations Manager ,CTS, Chennai.apr1991@rediffmail.com
6.	Dr.A.Muthamizh Selvan BoS Member Internal	Asso.Prof./CSA Periyar Maniammai Institute of Science & Technology, Vallam.
7.	Dr.S.Arumugam BoS Member Internal	Asso.Prof./CSA Periyar Maniammai Institute of Science & Technology, Vallam.
8.	Dr.V.Srithar BoS Member Internal	Asst.Prof./CSA Periyar Maniammai Institute of Science & Technology, Vallam.
9.	Dr.S.Bhuvaneswari BoS Member Internal	Asso.Prof./ Head Department of Mathematics Periyar Maniammai Institute of Science & Technology, Vallam.
10.	Dr. D. Thayalnayaki BoS Member Internal	Asso.Prof./ Head Department of Civil Engineering Periyar Maniammai Institute of Science & Technology, Vallam.
11.	Dr. V. Saranya BoS Member Internal	Asso.Prof./ Head Department of Languages, Periyar Maniammai Institute of Science & Technology, Vallam.

| 12. | Ms. K. Biruntha | II MCA, Periyar Maniammai Institute of Science & Technology, Vallam. |
| 13. | Mr. R. Muruganandham | Alumni, MCA Batch: 2019-2021 Machine learning engineer Changepond Technologies, Sipcot IT park, Siruseri, Chennai-103 |

The current MCA Curriculum is undergone in the **Board of Studies Meeting on 15.6.2023** to tune the syllabus towards Outcome based Education and meet the UGC requirements and in turn the suggestions provided will be implemented in Regulations 2023.

It is thoroughly felt there is a need to change the present curriculum in order to graduate the students who possess skills that are employable. Hence, appropriate modification in the existing curriculum will augment the manpower and skill requirement of our country. The quality of an educational system can be judged from at least three perspectives: the inputs to the system, what happens within the system and the outputs from the system. In order to refine the input to the system, BoS members redefined the curriculum with the focus towards outcome based education.

In this connection, it is felt to frame the department vision and attain the vision through a well-structured mission framed in consultation with the faculty members and other administrators of Periyar Maniammai Institute of Science and Technology.

Department Vision and Mission Definition Process

The development of vision and mission of the department is carried out as per the following steps.

Step: I Brainstorming/Feedback carried out at different levels

First level - Department faculty by the HOD

Second level – Current students by the faculty

Third level - Employers, alumni and academia and industry experts

Step: II Benchmarking with other Universities: Understanding the Vision and Mission

Step: III Validation by the Board of studies and then Academic Council

Step: IV Wide publicity in the department and institution

The University Vision is split up into small elements and verifies its compliance with Department Vision

To be a University of global dynamism with excellence in knowledge and innovation ensuring social responsibility for creating an egalitarian society

To be a leading, contemporary, innovative Computer Science and Applications department in inculcating professional competencies in the field of Computing and related interdisciplinary technologies to achieve

academic excellence and to facilitate research activities as a timely response to dynamic needs and challenges of industry and society.

UNIVERSITY VISION	DEPARTMENT VISION
To be a University of global dynamism with excellence in knowledge and innovation ensuring social responsibility for creating an egalitarian society	To be a leading, contemporary, innovative Computer Science and Applications department in inculcating professional competencies in the field of Computing and related interdisciplinary technologies to achieve academic excellence and to facilitate research activities as a timely response to dynamic needs and challenges of industry and society.
Global Dynamism **Excellence in Knowledge** **Social Responsibility**	Placement (Global Level) Teaching Learning (New Technologies) Contribution(Needs and challenges of Industry and Society)

To accomplish the vision stated, well-structured mission is established with consultation with administrators, faculty members and other officials.

UNIVERSITY MISSION	DEPARTEMNT MISSION
Offering well balanced programmes with scholarly faculty and state-of-art facilities to impart high level of knowledge.	Imparting quality education in the field of Computing Sciences and Applications and generate successful computing professional
Providing student - centered education and foster their growth in critical thinking, creativity, entrepreneurship, problem solving and collaborative work.	Encouraging students to collaborate with industry environment and analyze the real world problems culminating in efficient solutions.
Involving progressive and meaningful research with concern for sustainable development.	Transforming students into computing professionals and entrepreneurs by imparting quality training and hands on experience with latest tools and technologies.
Enabling the students to acquire the skills for global competencies.	Promoting activities in creating applications in emerging areas of computing technologies and applications in order to serve the needs of research, industry, society and scientific community.
Inculcating Universal values, Self respect, Gender equality, Dignity and Ethics.	Inculcating value based and ethical commitment for bringing out successful professionals.

Mapping of University Vision and Department Mission

	DM1	DM2	DM3	DM4	DM5	**Total**
UM1	3	1	1	1	1	**7**
UM2	1	2	3	2	0	**8**
UM3	0	1	2	3	2	**8**
UM4	1	1	3	3	0	**8**
UM5	1	1	0	1	3	**6**

3- Highly related   2- Medium   1– Low

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

Based on the mission of the department, the programme educational objectives is formulated as

PEO1	The graduate will apply the fundamental concepts of computing technologies in the industry related emerging application areas.
PEO2	The graduate will be able to analyse requirement, design and implement solution for a computing Applications
PEO3	The graduate of the programme will serve as a successful computing professional and researcher by practicing modern tools and technologies.
PEO4	The graduate will be able to excel in leadership, management, communication and decision making skill to become a successful professional and entrepreneur
PEO5	The graduate will be able to practice professional ethics, pursue higher studies in computing and to work in the fields of teaching and research.

PEO PROCESS ESTABLISHMENT

The faculty of the CSA department at our institution met on different occasions for discussion and a final work session to complete the steps of the process in order to draft the set of PEOs for CSA Department to assess the graduates few years after graduation.

MCA Curriculum and Syllabus

2023
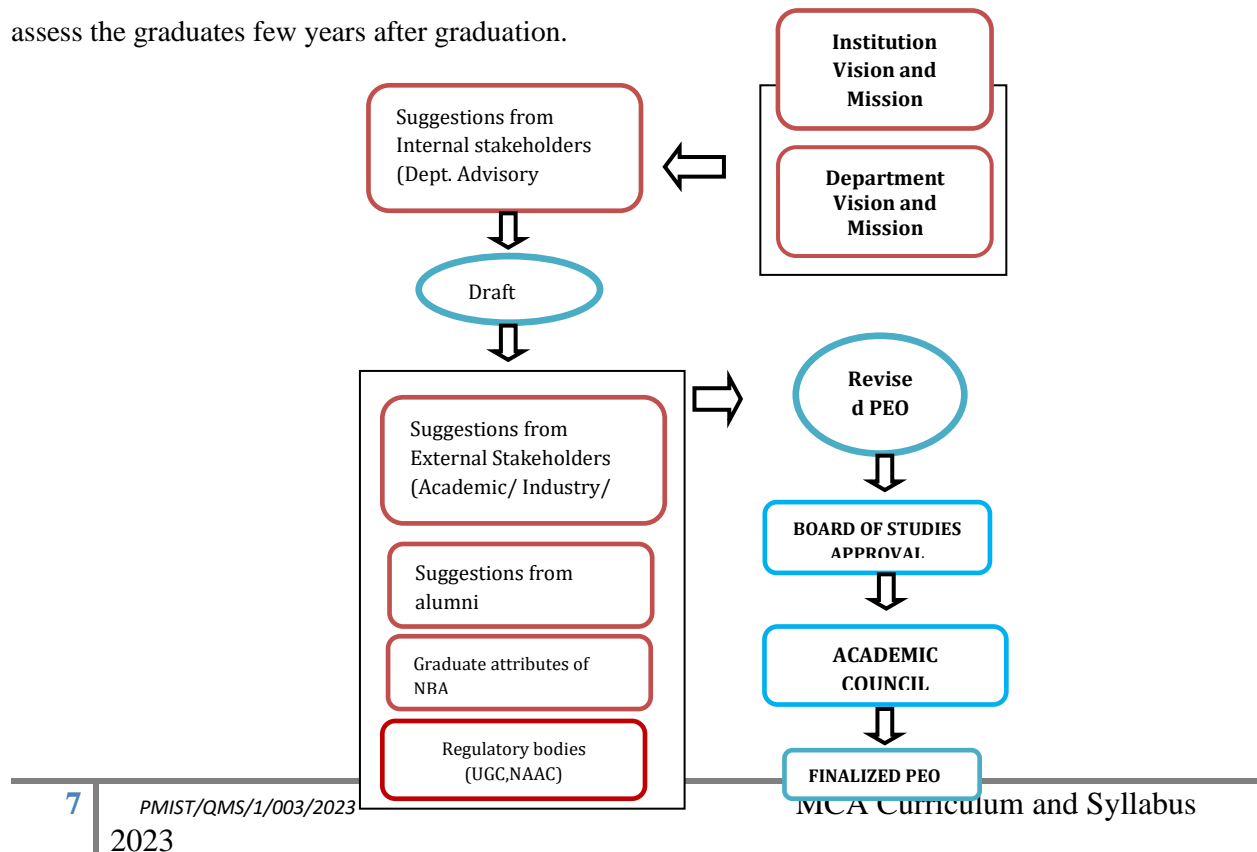
The framework for the review and revision of the PEOs at the departmental level involving all the faculty members comprised the following broad stages.

1. Using the key words and phrases extracted from the Mission Statement of the institution and department to identify attributes to gauge graduates.
2. Capturing the distinction between the educational objective and the student outcomes.
3. Formulating each objective to be measurable.

The program educational objectives for the MCA program describe accomplishments that graduates are expected to attain within three years after graduation. Graduates will have applied their expertise to contemporary problem solving, be engaged professionally, and have continued to learn and adapt, and have contributed to their organizations through leadership and teamwork.

Mapping of Program Educational Objectives (PEOs) with Department Mission (DM)

	DM1	DM2	DM3	DM4	DM5
PEO1	3	2	2	2	0
PEO2	2	3	2	2	0
PEO3	2	0	3	2	1
PEO4	1	0	1	1	2
PEO5	0	1	1	2	3
Total	8	6	9	9	6

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

The development of vision, mission and programme educational objectives is tuned in line with the global and national standards and it is assured that the department vision and mission will facilitate in meeting the vision and mission of the University.

The Program Educational Objectives shall cover both technical and professional aspects of the expected achieve-Achievement in terms of technical skills required in the profession for which the program prepares students

➢ Achievements in terms of professional, ethical, and Communicational aspects required by the profession for which the program prepares students (team work, ethical behavior, effective communication, etc.)

- Achievements in terms of management and leadership skills (project managers, directors, CTOs, CEOs, etc.)
- Achievements in terms of life-long learning and continuous education (certifications, conferences and workshops attendance, etc.)
- Achievements in terms of advanced and graduate studies pursuing (graduate studies, research careers, etc.)
- Other aspects could be considered when defining educational objectives such as the ability to engage in entrepreneurship activities

SUMMARY OF THE FEED BACK OBTAINED

Total number of feedback collected: 35

In that the following important observations were made,

1. Python Programming, Python Programming Laboratory,Object Oriented Programming Language, Bigdata Analytics Laboratory, Data Visualisation Lab and Computer Graphics and Multimedia Laboratory were added.

2. The value added course are added.

   - DevOps
   - AWS
   - Google Cloud
   - Go Programming
   - Google Cloud

PROGRAMME OUTCOME (PO)

At the time of graduation, competency of the student is measured through the attainment of programme outcomes. The quantification of programme outcomes attainment is measured through the assessment of established course outcomes for each course.

PROGRAMME OUTCOME (PO) AND PROGRAMME SPECIFIC OUTCOMES(PSO)
PROGRAMME OUTCOMES (POs)

PO1	To apply fundamental knowledge of Mathematics and Principles of Computing technologies in the field of computing sciences and application areas
PO2	To analyze and apply Programming principles, and computer science theory in design and development of solution.
PO3	To design algorithms, conduct experiments and interpret result to provide valid solutions for computing environment.

PO4	To investigate research related issues and apply modern application tool, and appropriate paradigm for the construction of software system.
PO5	Ability to Communicate effectively with the computing community about requirements and able to present the result clearly.
PO6	Ability to work with technical, management, leadership and entrepreneurial skillsso as to deliver effective product within a time constraints
PO7	Ability to apply knowledge of professional, ethical, and security issues involving in creating software and maintaining it.
PO8	Ability to express enthusiasm for self-improvement through continuous professional development and life-long learning.

Programme Specific Outcome

PSO1	**Web Application Development:** Analyse the environment of web based application requirement and produce the interactive web site.
PSO2	**Structured Software Development Methodologies:** Apply structured methods and tools to develop effective software with necessary documents.

Graduates Attributes

Graduates Attributes (GAs) form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practice at the appropriate level. The GAs are examples of the attributes expected of a graduate from an accredited programme. The computing professional Graduate Attributes of the NBA are as following:

1. **Computational Knowledge:** Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

2. **Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

3. **Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

4. **Conduct Investigations of Complex Computing Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

6. **Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

7. **Life-long Learning:** Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

8. **Project management and finance:** Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

9. **Communication Efficacy:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

10. **Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

11. **Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

12. **Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

Mapping of Program Outcomes (POs) with Graduate Attributes (GAs)

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA 12
PO1	3	1	0	1	0	0	0	0	0	0	0	1
PO2	2	2	0	0	0	0	0	0	0	0	0	1
PO3	1	0	2	0	0	0	0	0	0	0	0	0
PO4	0	2	2	2	2	0	0	2	0	0	0	0
PO5	0	0	0	0	0	0	0	0	2	1	2	0
PO6	0	0	0	0	0	0	0	0	0	0	0	2
PO7	0	0	0	0	0	3	0	0	0	0	0	0
PO8	0	0	0	0	0	0	2	0	0	0	0	0
PSO 1	2	2	1	2	2	1	2	2	2	1	1	2
PSO2	2	2	1	2	2	1	2	2	2	1	1	2

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

Mapping of Program Educational Objectives (PEOs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	Total
PEO 1	3	3	0	0	2	0	0	0	1	1	10
PEO 2	1	3	3	2	2	1	1	0	2	3	18
PEO 3	1	0	2	3	0	0	0	0	2	3	11
PEO 4	2	1	1	2	2	3	0	0	2	2	15
PEO 5	0	0	0	0	1	1	3	1	1	1	08

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

PO PROCESS ESTABILSHMENT
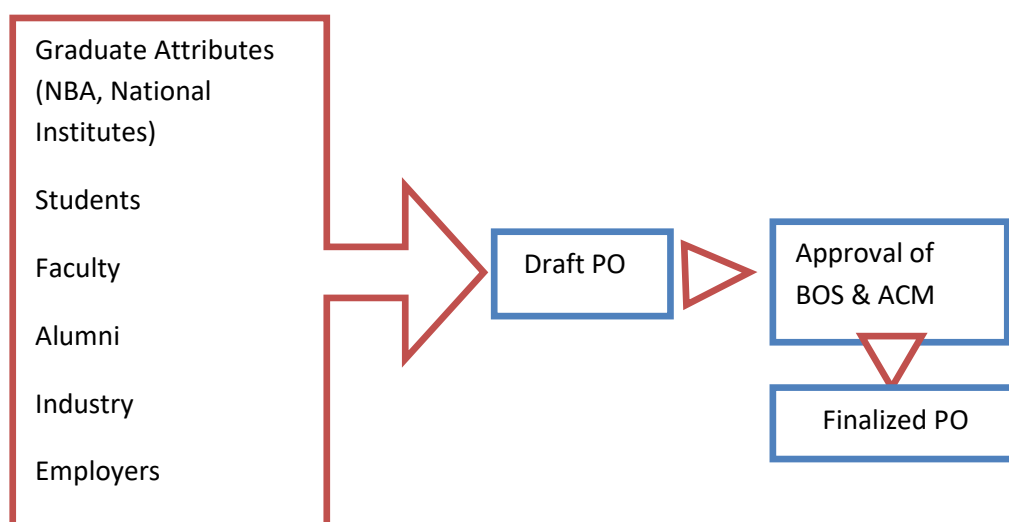
CURRICULUM DEVELOPMENT

The CSA curriculum is drawn to define the role of computer applications to meet the global challenges and equip them in implementing proven techniques and procedures to provide sustainable solutions for PRACTICAL problems of society. In addition to their technical competencies, students must possess engagement skills, sustained learning and adapting, leadership, teamwork with good command in the communication skills.

The faculty members have been allotted for developing the courses and its outcomes as given below. They in turn conducted frequent discussions with each other and with students in drafting the course content.

The curriculum development is ensured that students receive integrated, coherent learning experiences that contribute towards their personal, academic and professional learning and development.

12   *PMIST/QMS/1/003/2023*
2023
     MCA Curriculum and Syllabus

Courses and topics were designed and developed within a framework which comprises a specified curriculum, specified assessment arrangements, and clearly identified educational aims and learning outcomes.

Faculty Members Assigned for Course Development

Course Code	Course Title	Staff Allotted
YCA101	Database Management Systems	Dr.S.Manimozhi
YCA102	Cryptography and Network Security	Dr.V.Srithar
YCA103	Python Programming	Ms.P.Ranjani
YCA104	Mathematical Foundation for Computer Applications	Maths
YCA105	Software Engineering	Dr.S.Manimozhi
YCA106	Database Management Systems Laboratory	Dr.S.Manimozhi
YCA107	Python Programming Laboratory	Ms.P.Ranjani
YCA108	Soft Skill Development	Ms.K.Nandhini
YCA201	Big Data Analytics	Dr.A.Muthamilselvan
YCA203	Advanced Data Structures	Ms.G.Umamaheswari
YCA204	Object Oriented Programming Language	Ms.I.Epistle
YCA206	Advanced Data Structures Laboratory	Ms.G.Umamaheswari
YCA207	Object Oriented Programming Language Laboratory	Ms.I.Epistle
YCA208	Data Visualisation Lab	Dr.G.Preethi
YCA301	Artificial Intelligence and Machine Learning	Ms.T.Logesh
YCA302	Computer Graphics and Multimedia	Ms.R.Manisha
YCA307	Artificial Intelligence and Machine Learning Lab using Python	Ms.T.Logesh
YCA308	Computer Graphics and Multimedia Lab	Ms.R.Manisha
YCABE5A	Foundations of Decision Processes	Dr.S.Arumugam
YCABE5B	Corporate Planning	Dr.S.Arumugam
YCABE5C	Management of Software Projects	Dr.S.Arumugam
YCABE5D	Enterprise Resource Planning	Dr.S.Arumugam
YCACE3A	Cloud Computing	Dr.Manikandan
YCACE3B	Human-Computer Interface	Dr.G.Preethi
YCACE3C	Digital Image Processing	Ms.M.Lavanya
YCACE3D	Natural Language Processing	Ms.R.Ragini
YCACE4A	Deep Learning	Dr.D.Ruby
YCACE4B	Exploratory Learning	Ms.M.Swathi
YCACE4C	Business Intelligence	Ms.K.Nandhini
YCACE4D	Predictive Analytics	Ms.R.Sivaranjnai

COURSE DEVELOPMENT

The following elements were developed by the faculty involved after interaction and discussions.
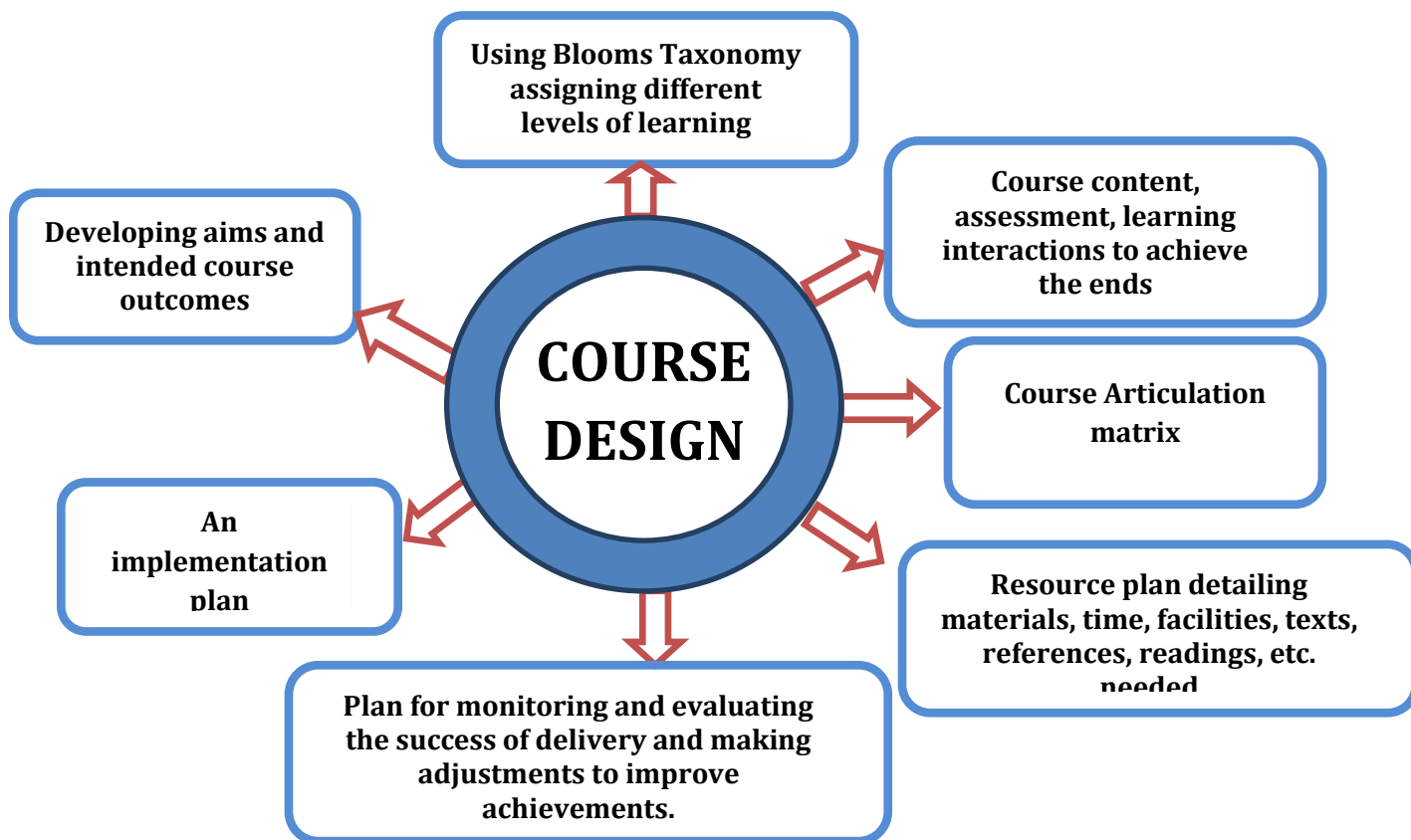
In aligning programme outcome and graduate attributes, course offered to the degree programme are finalized based on the standard template finalized by the university.

SUMMARY OF CREDITS

Course / Semester	Sem I		Sem II		Sem III		Sem IV		Total	
	Courses	Credits	Courses	Credits	Courses	Credits	Courses	Credits	Courses	Credits
Core Courses	6	17	5	15	4	10	0	0	15	42
Elective Courses	0	0	2	6	2	6	0	0	4	12
Skill Enhancement Course	1	2	1	2	0	0	0	0	2	4
Mathematics	1	5	0	0	0	0	0	0	1	5

Mini Project	0	0	0	0	1	3	0	0	1	3
Industrial Lectures	0	0	0	0	1	2	0	0	1	2
Review of Literature	0	0	0	0	0	0	1	3	1	3
Project	0	0	0	0	0	0	1	11	1	11
Total	8	24	8	23	8	21	2	14	26	82

REQUISITE MAPPING
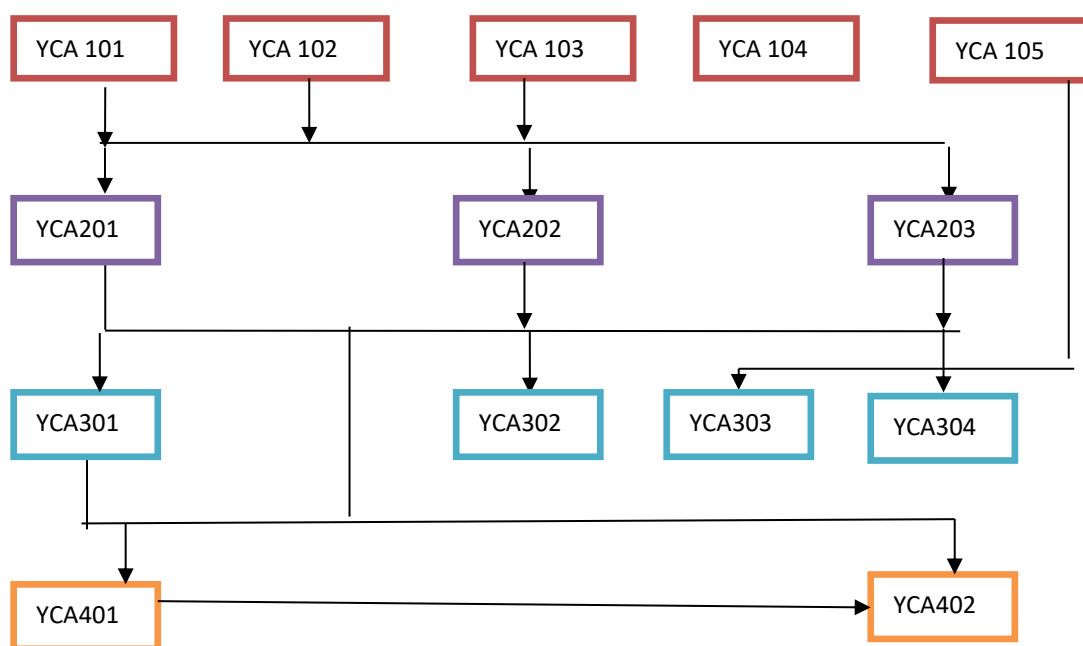
MCA – MASTER OF COMPUTER APPLICATIONS

REGULATION 2023

SEMESTER- I

Course Code	Course Title	L	T	P	H	C
YCA101	Database Management Systems	3	0	0	3	3
YCA102	Cryptography and Network Security	3	0	0	3	3
YCA103	Python Programming	3	1	0	4	4
YCA104	Mathematical Foundation for Computer Applications	4	1	0	5	5
YCA105	Software Engineering	3	0	0	3	3
YCA106	Database Management Systems Laboratory	0	0	4	4	2
YCA107	Python Programming Laboratory	0	0	4	4	2
YCA108	Soft Skill Development	2	0	2	2	2
	Total	**18**	**02**	**10**	**28**	**24**

SEMESTER- II

Course Code	Course Title	L	T	P	H	C
YCA201	Big Data Analytics	3	1	0	4	4
YCAME2*	Elective-I	3	0	0	3	3
YCA203	Advanced Data Structures	3	1	0	4	4
YCA204	Object Oriented Programming Language	3	0	0	3	3
YCABE5*	Elective -II	3	0	0	3	3
YCA206	Big Data Analytics Laboratory	0	0	4	4	2
YCA207	Object Oriented Programming Language Laboratory	0	0	4	4	2
YCA208	Data Visualisation Laboratory	0	0	2	2	2
	Total	**15**	**02**	**10**	**27**	**23**

SEMESTER- III

Course Code	Course Title	L	T	P	H	C
YCA301	Artificial Intelligence and Machine Learning	3	0	0	3	3
YCA302	Computer Graphics and Multimedia	3	0	0	3	3
YCACE3*	Elective-III	3	0	0	3	3
YCACE4*	Elective -IV	3	0	0	3	3
YCA305	Mini Projects	3	0	0	3	3
YCA306	Industrial Lecturers	0	0	2	2	2
YCA307	Artificial Intelligence and Machine Learning Laboratory using Python	0	0	4	4	2
YCA308	Computer Graphics and Multimedia Laboratory	0	0	4	4	2
	Total	**20**	**2**	**8**	**30**	**26**

SEMESTER-IV

Course Code	Course Title	L	T	P	H	C
YCA401	Review of Literature	3*(SS)	0	-	3	3
YCA402	Main Project	0	0	24	24	11
	Total	**3*(SS)**	**0**	**24**	**27**	**14**

Elective I

Course Code	Course Title	L	T	P	H	C
YCAME2A	Optimization Techniques	3	0	0	3	3
YCAME2B	Automata Theory	3	0	0	3	3
YCAME2C	Numerical Methods	3	0	0	3	3
YCAME2D	Combinatorics	3	0	0	3	3

Elective II

Course Code	Course Title	L	T	P	H	C
YCABE5A	Foundations of Decision Processes	3	0	0	3	3
YCABE5B	Corporate Planning	3	0	0	3	3
YCABE5C	Management of Software Projects	3	0	0	3	3
YCABE5D	Enterprise Resource Planning	3	0	0	3	3

Elective III

Course Code	Course Title	L	T	P	H	C
YCACE3A	Cloud Computing	3	0	0	3	3
YCACE3B	Block Chain	3	0	0	3	3
YCACE3C	Digital Image Processing	3	0	0	3	3
YCACE3D	Natural Language Processing	3	0	0	3	3

Elective IV

Course Code	Course Title	L	T	P	H	C
YCACE4A	Deep Learning	3	0	0	3	3
YCACE4B	Exploratory Learning	3	0	0	3	3
YCACE4C	Business Intelligence	3	0	0	3	3
YCACE4D	Predictive Analytics	3	0	0	3	3

YCA101   DATABASE MANAGEMENT SYSTEMS

Course Outcomes:

CO1	C	Understand	**Explain** the basic concepts of Database and architecture
CO2	C	Understand	**Outline** the Data and ER model
CO3	C	Understand	**Explain** Relational data models, algebra and relational calculus
CO4	C	Understand	**Illustrate** relational data base and its design
CO5	C	Understand	**Interpret** the concepts of transactions and its properties
CO6	C	Understand	**Interpret** the various application fields of DBMS

COURSE CODE	COURSE NAME	L	T	P	C
YCA101	**DATABASE MANAGEMENT SYSTEMS**	**3**	**0**	**0**	**3**
C:P: A = 3:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Basic Computer Skill	**3**	**0**	**0**	**3**

UNIT I : BASIC CONCEPTS	9

Database & Database Users. Characteristics of the Database Approach advantages of using DBMS. Data Models, Schemas & Instances. DBMS Architecture & Data Independence. System Architecture for DBMS and Data Dictionary, Database Users Data Base languages & Interfaces. Data Modeling using the Entity-Relationship Model -Entity types, Entity Sets, Attributes and Keys, Relationship, Relationship Types, Week Entity Types, Structural Constraints, Enhanced ER Model- Specialization Generalization, Constraints on Specialization Generalization.

UNIT II : RELATIONAL MODEL, LANGUAGES & SYSTEMS	9

Relational Data Model Concepts and Constraints. Relational Algebra - select, project, set theoretic, join operations. Overview of Relational Calculas. SQL - A Relational Database Language. Data Definition commands, View and Queries , transaction commands, Specifying Constraints & Indexes in SQL.

UNIT III: RELATIONAL DATA BASE DESIGN	9

Function Dependencies & Normalization for Relational Databases. Informal design guidelines for relation schemas, Functional Dependencies. Normal forms based on primary keys (INF, 2NF, 3NF& BCNF). Lossless join & Dependency preserving decomposition. Multivalued dependencies, join dependencies (4NF & 5NF), Denormalization.

UNIT IV : TRANSACTIONS, CONCURRENCY CONTROL, RECOVERY TECHNIQUES	9

 Basic concept; ACID properties; transaction state; implementation of atomicity and durability; concurrent executions; basic idea of serializability; view and conflict serializabllity Recovery Techniques Failure Classification , Storage Structure, Recovery and Atomicity Log Based Recovery, Shadow Paging ,stable storage implementation, data access; recovery and atomicity - log based recovery, deferred database modification, immediate database modification, checkpoints.

UNIT- V: EMERGING FIELDS IN DBMS	9

Distributed databases-Basic idea-distributed data storage- data replication-data fragmentation horizontal, vertical and mixed fragmentation- Concepts of Multimedia databases and Object oriented data base management systems. Data Warehousing & mining-.Intrusion Detection and Prevention Systems - Types of IDPS- IDPS Detection Methods- IDPS Response Behavior- Selecting IDPS Approaches and Products- Strengths and Limitations of IDPSs- Deployment and Implementation of an IDPS-Measuring the Effectiveness of IDPSs

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT

1. Avi Silberschatz, Henry F. Korth, S. Sudarshan , "Database System Concepts", Seventh Edition, McGraw-Hill, ISBN 9780078022159, March 2019.
2. Muhammad Sharif, "Complete book Database management systems Handbook", 3rd Edition, August 2022

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1. S.K.Singh, , "Database Systems, Concepts, Design and Applications" , Pearson Education, 2020.
2. Raghu Ramakrishnan, Johannes Gehrke ,"Database Management Systems", McGraw Hill Publication,2018
3.Elmsari, Navathe , "Fundamentals of Database Systems" by, 5th Edition, Pearson Education ,2008.

E REFERENCES

1. Prof. Partha Pratim Das and Prof. Samiran Chattopadhyay , "Data Base Management System", IITKGP, https://onlinecourses.nptel.ac.in/noc22_cs51/preview

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

<p style="text-align:center">YCA102   CRYPTOGRAPHY AND NETWORK SECURITY</p>

Course Outcomes:

CO1	C	Understand	*Understand* the overview of the cryptography basics model**.**
CO2	C	Understand	*Infer* the idea of cryptography algorithm
CO3	C	Understand	*Explain* various security technology
CO4	C	Understand	*Illustrate* Firewalls and its model
CO5	C	Understand	*Summarize* Virtual Private Networks and its Model
CO6	C	Understand	*Understand* the implementation of security and change management

COURSE CODE	COURSE NAME	L	T	P	C
YCA102	**CRYPTOGRAPHY AND NETWORK SECURITY**	**3**	**0**	**0**	**3**
C:P:A 3:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Basic Computer Skill	**3**	**0**	**0**	**3**

UNIT I OVERVIEW	**9**
Services, Mechanisms and Attacks, The OSI Security Architecture, A Model for Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Steganography	

UNIT II ALGORITHMS	**9**
Simplified DES- Key Management, Diffe-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.	

UNIT III PLANNING FOR SECURITY	**9**
Information Security Planning and Governance-Information Security Policy, Standards, and Practices -The Information Security Blueprint -Security Education, Training, and Awareness Program -Continuity Strategies.	

UNIT IV FIREWALLS AND VPNS	**9**
Access Control -Firewalls -Firewall Processing Modes -Firewalls Categorized by Generation -Firewalls Categorized by Structure-Firewall Architectures -Selecting the Right Firewall -Configuring and Managing Firewalls-Content Filters -Protecting Remote Connections -Remote Access -Virtual Private Networks.	

UNIT V INTRUSION DETECTION AND PREVENTION SYSTEMS	**9**
Introduction-Intrusion Detection and Prevention Systems - Types of IDPS- IDPS Detection Methods-IDPS Response Behavior- Selecting IDPS Approaches and Products- Strengths and Limitations of IDPSs- Deployment and Implementation of an IDPS-Measuring the Effectiveness of IDPSs	

	LECTURE	**TUTORIAL**	**TOTAL**
	45	**-**	**45**

	TEXT
	1. Michael E.Whitman, and Herbert J.Mattord, Principles of Information Security 4th edition, Cengage Learning 2012.
	2. Cryptography and Network Security Third Edition William Stallings, Prentice Hall, 2002

REFERENCES

1. **N**ozaki, Micki Krause, Tipton, Harold F, Information Security Management Handbook - 6th Edition CRC Press,2012
2. Hossein Bidgoli, Handbook of Information Security-Information Warfare; Social,Legal, and International Issues;and Security Foundations,John Wiley& Sons Inc.2006

E REFERENCES

1. https://onlinecourses.nptel.ac.in/noc15_cs03
2. https://onlinecourses.nptel.ac.in/noc16_cs01

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

<p style="text-align:center">YCA103   Python Programming</p>

Course Outcomes:

CO1	C	Understand	**Explain** the programming skills in core Python.
CO2	C	Understand	**Outline** the functionalities of Strings and function
CO3	C	Understand	**Illustrate** object oriented skills in Python
CO4	C	Understand	**Comprehend** various Python Packages
CO5	C	Understand	**Infer** web applications using Django
CO6	C	Understand	**Infer** Query process using Django

COURSE CODE	COURSE NAME	L	T	P	C
YCA103	**Python Programming**	**3**	**1**	**0**	**4**
C:P:A = 4:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Skill	3	1	0	4

UNIT I : INTRODUCTION	12

Introduction : Fundamental ideas of Computer Science - Strings, Assignment, and Comments - Numeric Data types and Character sets – Expressions – Loops and Selection Statements: Definite iteration: the for Loop - selection: if and if-else statements - Conditional iteration: the while Loop

UNIT II : STRINGS AND FUNCTIONS	12

Strings and Text Files: Accessing Characters and substrings in strings - Data encryption-Strings and Number systems- String methods – Text - Lists and Dictionaries: Lists – Dictionaries – Design with Functions: A Quick review - Problem Solving with top-Down Design - Design with recursive Functions - Managing a Program's namespace - Higher-Order Functions

UNIT III: DESIGN WITH CLASSES	12

Design with Classes: Getting inside Objects and Classes – Data-Modeling Examples – Building a New Data Structure – The Two – Dimensional Grid - Structuring Classes with Inheritance and Polymorphism - Graphical User Interfaces - The Behavior of terminal-Based programs and GUI-Based programs - Coding Simple GUI-Based programs - Windows and Window Components - Command Buttons and responding to events

UNIT IV : WORKING WITH PYTHON PACKAGES	12

Working with Python Packages: NumPy Library-Ndarray – Basic Operations – Indexing, Slicing and Iteration – Array manipulation - Pandas –The Series – The DataFrame - The Index Objects – Data

Vizualization with Matplotlib – The Matplotlib Architecture – pyplot – The Plotting Window – Adding Elements to the Chart – Line Charts – Bar Charts – Pie charts

UNIT- V: DJANGO	**12**

Django: Installing Django – Building an Application – Project Creation – Designing the Data Schema - Creating an administration site for models - Working with QuerySets and Managers – Retrieving Objects – Building List and Detail Views

	LECTURE	**TUTORIAL**	**TOTAL**
	60	**0**	**60**

TEXT
1. 1. K.A. Lambert, " Fundamentals of Python: first programs", Second Edition, Cengage Learning, 2018
2. Fabio Nelli, "Python Data Analytics: With Pandas, NumPy, and Matplotlib", Second Edition, Kindle Edition, 2018
3. Antonio Mele, "Django 3 By Example", Third Edition, 2020

REFERENCES
1.John Paul Mueller & Luca Massaron, Python for Data Sciences for Dummies, Kindle Edition, 2015
2.Dr.Gabriele Lanaro & Quan Nguyen, Leaning Path Advanced Python Programming, Kindle Edition, 2019

E REFERENCES
1. https://onlinecourses.nptel.ac.in/noc18_cs35
2.https://nptel.ac.in/courses/106105166/26
3.https://nptel.ac.in/courses/117106113/34

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

Course Code	Course Name	L	T	P	C
YCA104	**Mathematical foundation for Computer Applications**	**4**	**1**	**0**	**5**
C:P:A = 5:0:0		L	T	P	H
		4	**1**	**0**	**5**
	Course Outcomes:	**Domain**		**Type**	
CO1	**Discuss** the basic fundamentals of statistics and measures	**Cognitive**		Remembering	
CO2	**Identify** the concept of sampling technique	**Cognitive**		Understanding	
CO3	**Describe** about the charts and analysis	**Cognitive**		Remembering	
CO4	**Discuss** about the statistics analysis	**Cognitive**		Understanding	
CO5	**Describe** the various implementation	**Cognitive**		Understanding	
CO6	**Explain** the statistical models are implemented in Programming languages.	**Cognitive**		Understanding	

UNIT- I: Introduction	**12+3**

Basic Statistics: Measures of central tendencies - Measures of dispersion - Frequency distributions - Moments - Correlation coefficient - Regression.

UNIT- II: Sampling statistical computing	**12+3**

Sampling: Theory of sampling - population and sample - Survey methods and estimation Statistical inference - Testing of hypothesis and inference

UNIT- III: Statistics For Business	**12+3**

Computing frequency charts - Regression analysis.

UNIT- IV: Data Analysis	**12+3**

Time series and forecasting

UNIT- V:Implementation	**12+3**

Implementation: Using a programming language - a database system - Programming styles - reusability - extensibility - robustness - Programming-in-the-large - case study.

	LECTURE	**TUTORIAL**	**TOTAL**
	60	**15**	**75**

TEXT

1. Tanner, M. A..," Tools for Statistical Inference: Methods for the Exploration of Posterior Distribution" Springer Verlag: New York., third Eition.,1996

REFERENCES

1. Affi, A.A., "Statistical Anal);sis: A Computer Oriented Approach". Academic Press, New York, 1979. Hogg. R. v..Et. Al., "Introduction to Mathematical Statistics", American Publishing, New York. 1980.

Table 1: COs vs POs Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	2	2	1	2	2	2	2	2	2
CO 2	3	2	2	2	2	2	2	2	2	2
CO 3	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	1	2	2	2	2	2	2
CO 5	2	2	2	2	2	2	2	2	2	2
CO 6	2	2	2	2	2	2	2	2	2	2
Total	14	12	12	10	12	12	12	12	12	12
Scaled Value	3	2	2	2	2	2	2	2	2	2

Course Code	Course Name	Credits	Domain		Hours / Week				Max. Marks		
			C : P : A	L	T	P	Tot.	CIA	ESE	Tot.
YCA105	**SOFTWARE ENGINEERING**	**3**	**3 : 0 : 0**	**3**	**0**	**---**	**5**	**50**	**50**	**100**
Pre-requisite	**Familiar with the Foundations of computing, Programming languages, Coding and Basics of software.**										

Course Outcomes *On successful completion of this course, the students will able to :*		Domain	Level
CO1	*Understand* various software process models and modeling techniques to represent software systems accurately	Cognitive	K1 - K2
CO2	*Apply* various design concepts, *Analyze* user experience and *Evaluate* design choices for usability and accessibility	Cognitive	K2 - K4
CO3	*Implement* the software quality assurance practices, *Enhance* the software reliability, and *Integrate* the security measures	Cognitive	K2 - K3
CO4	*Understand* and *Apply* various software testing procedures and techniques	Cognitive	K2 - K3
CO5	*Understand* and *Apply* the S/W reuse and analytics process and service oriented s/w engineering concepts	Cognitive	K2 - K3
CO6	*Understand* and *Apply* the systems and real-time software engineering	Cognitive	K2 - K3

∗ **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

UNIT – I : Software Process and Modeling	7

Software Process - Generic Process Model - Prescriptive Process Models - Product and Process - Agile Process and its Frameworks - Prototype Construction, Evaluation and Evolution - Modelling Principles - Requirements Analysis - Scenario-based Modelling - Class-based Modelling - Functional Modelling - Behavioural Modelling.

UNIT – II : Software Design Concepts	7

Design Process - Design Concepts - Design Model - Software Architecture - Architectural Styles - Architectural Design - Designing Class-Based Components - Conducting Component-Level Design - User Experience Design Elements - User Experience Analysis - User Experience Design - User Interface Design - Design Evaluation - Usability and Accessibility.

UNIT – III : Software Quality and Security	7

Software Quality : Achieving Software Quality - Review Metrics and Their Use - Formal and Informal Reviews - Review Guidelines - Software Quality Assurance (SQA) - Elements of SQA - Tasks, Goals and Metrics of SQA – Software Reliability - ISO 9000 Standards. Software Security : Security Life Cycle Models - Secure Development Life-Cycle Activities - Security Risk Analysis - Threat Modeling, Prioritization, and Mitigation - Attack Surface - Secure Coding.

UNIT – IV : Software Testing	8

Software Testing : Strategic Approach - Unit Testing - White-Box Testing - Black-Box Testing - Object-Oriented Testing - Integration Testing - Mobility Testing Strategies - Web Testing Strategies - Security Testing - Performance Testing - Real-Time Testing - Testing AI Systems - Testing Virtual Environments.

UNIT – V : Software Analytics and Reuse	8

Software Analytics : Product Metrics - Metrics for Testing - Metrics for Maintenance - Process and Project Metrics - Metrics for Software Quality. Software Reuse : Application Frameworks - Application system reuse. Service-Oriented Software Engineering : Service-oriented Architecture - RESTful Services - Service Engineering - Service Composition.

UNIT – VI : Systems and Real-Time Software Engineering	8

Systems Engineering : Sociotechnical Systems - Conceptual Design - System Procurement - System Development - System Operation and Evolution. Real-time Software Engineering : Embedded System Design - Architectural Patterns for Real-time Software - Timing Analysis - Real-time Operating Systems.

	Lecture	Tutorial	Practical	Total
	45	**0**	**0**	**45**

Reference Books

1. Sommerville, Ian (2016). Software Engineering. 10 th Edition, Pearson Education Limited, Boston.
2. Roger S. Pressman, and Bruce R. Maxim (2020). Software Engineering : A Practitioner's Approach, 9 th Edition, McGraw-Hill Education, New York.
3. Sommerville, Ian (2021). Engineering Software Products : An Introduction to Modern Software
Engineering. Pearson Education Ltd.
4. Aggarwal, K. K., Singh, Y. (2008). Software Engineering. India : New Age International

Web References
1. NPTEL Course : Software Engineering by Prof. Rajib Mall | IIT Kharagpur,
https://onlinecourses.nptel.ac.in/noc23_cs122/preview
2. Alison Online Course : Software Engineering https://alison.com/tag/software-engineering
3. Coursera Online Course : Introduction to Software Engineering by IBM
https://www.coursera.org/learn/introduction-to-software-engineering

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA106 -DATABASE MANAGEMENT SYSTEMS LABORATORY

Course Outcomes:

CO1   C   Applying   ***Build*** the concept of DBMS programming and its fundamental

CO2   C   Applying   ***Build*** an application program using concepts

CO3   C   Applying   ***Develop*** an application program using a data model

CO4   C   Applying   ***Develop*** the query technical processing in data base managements

CO5   C   Applying   ***Explain*** and ***Implement*** the normalization concept for a table of data

CO6   C   Applying   **Apply** the query for technical processing in database management

Course Code	Course Name	L	T	P	C
YCA106	**DATABASE MANAGEMENT SYSTEMS LABORATORY**	**0**	**0**	**4**	**2**
C:P:A = 2:0:0		**L**	**T**	**P**	**H**
PREREQUISITE	Basic Computer Skill	**0**	**0**	**4**	**4**

Lab Exercises	**30`**

1. Create an Account database in SQL.
2. Develop a Database design for magazine agency.
3. Implement the Nested Queries for Ticket booking.
4. Create views for a particular table using Personal accounts such as insurance, loans, mortgage payments etc.
5. Implement Join operations in SQL using Doctor's diary.
6. Create a program to implement JDBC connectivity for Personal bank account
7. Create a program to implement ODBC connectivity for students' mark statement
8. Create a database and develop interface for Personal library.
9. Write PL/SQL procedure for an application using Hostel accounting
10. Write PL/SQL procedure for an application using History of cricket scores
11. Write PL/SQL procedure for an application using Cable transmission program.

	LECTURE	TUTORIAL	PRACTICALS	TOTAL
	0	**0**	**30**	**30**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA107 PYTHON PROGRAMMING LABORATORY

Course Outcomes:

CO1   C   Applying   Develop the program with the concept of python scripts

CO2   C   Applying   Build the programs using elementary data items

CO3   C   Applying   Create the program by using Python programs with conditionals and loops

CO4   C   Applying   Build the program by structuring Python program

CO5   C   Applying   Build the program by using Libraries in Python

CO6   C   Applying   Implement the concept of. web programming with Django

Course Code	Course Name	L	T	P	C
YCA107	**PYTHON PROGRAMMING LABORATORY**	**0**	**0**	**4**	**2**
C:P:A = 2:0:0		L	T	P	H
PREREQUISITE	Basic Computer Skill	**0**	**0**	**4**	**4**
Lab Exercises					**30**

1. Program using elementary data items, lists, dictionaries and tuples
2. Program using conditional branches, loops
3. Program using functions
4. Program using classes and objects
5. Program using inheritance
6. Program using polymorphism
7. Program using Numpy
8. Program using Pandas
9. Program using Matplotlib
10. Program for creating dynamic and interactive web pages using forms

	LECTURE	TUTORIAL	PRACTICALS	TOTAL
	0	**0**	**30**	**30**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA108   SOFT SKILL DEVELOPMENT

Course Outcomes:

CO1	C	Remembering	**Define** basic communication skills in professional and social contexts effectively
CO2	C	Remembering	**Define** verbs and apply it in situational context.
CO3	C	Remembering	**Define** Technical Writing
CO4	C	Remembering	**Find out** listening and reading skills through comprehension passages
CO5	C	Remembering	**List the** leadership qualities and interpersonal communication
CO6	C	Remembering	**Relate** leadership qualities and interpersonal communication

COURSE CODE	COURSE NAME	L	T	P	C
YCA108	**SOFT SKILL DEVELOPMENT**	**2**	**0**	**0**	**2**
C:P: A : 2:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Basic English Skills	**2**	**0**	**0**	**2**
UNIT I TECHNICAL WRITING					**6**
Characteristics of Technical Writing -2. Development of Employability Skills-3. Vocabulary Development-Sentence Completion- Error Spotting					
UNIT II INTERPRETION IN WRITING					**6**
Interpretation of Verbal Analogy -Interpretation of Reading (Comprehension -Conception)- . Interpretation of Reading (Comprehension -Reasoning)- Practice for writing E-mails/Technical Blogs/Forums- PPT Preparation / Demonstration of Technical Presentation					
UNIT III INTERVIEW PREPARATION					**6**
Preparation of Resume - Preparation for Job Interviews / Mock Interview Section- Group Discussion Skills- Developing Listening Skill(Comprehension)					
UNIT IV GENERAL CONVERSATION					**6**
Practice for Short Speeches / Situational Conversation- English through Mass Media - Essential Grammar-Communicating and collaborating with peer member					
UNIT V TEAM EMPOWERMENT					**6**
Team Empowerment- Persuasive Communication- Merits and Demerits in Team Communication					

	LECTURE	TUTORIAL	TOTAL
	30	**-**	**30**

TEXT
1. Uma Narula, "Development Communication: Theory and Practice", Revised Edition, Har-Aanad Publication, 2019.

2. Annette Capel and Wendy Sharp, "Cambridge English: Objective First", Fourth Edition, Cambridge University Press, 2013.

3. Emma Sue-Prince, "The Advantage: The 7 Soft Skills You Need to Stay One Step Ahead", First Edition, FT Press, 2013.

4. Guy Brook-Hart, "Cambridge English: Business Benchmark",Second Edition, Cambridge University Press, 2014.

5. Norman Lewis, "How to Read Better & Faster", Binny Publishing House, New Delhi, 1978.

REFERENCES

1. Michael McCarthy and Felicity O'Dell, "English Vocabulary in Use:100 Units of Vocabulary Reference and Practice", Cambridge UniversityPress,1996.
2. Murphy, Raymond, "Intermediate English Grammar", Second Edition, Cambridge University Press, 1999.

E REFERENCES

1. https://onlinecourses.nptel.ac.in/noc23_hs10/
2. https://onlinecourses.nptel.ac.in/noc22_hs77/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

YCA201 BIGDATA ANALYTICS

Course Outcomes:

CO1	C	Remember	**Find** out the importance of big data tools & Information Standard format
CO2	C	Remember	**Define** the basic concepts of big data
CO3	C	Remember	**List** out importance of NoSQL
CO4	C	Remember	**Define** Hadoop, HDFS and MapReduce concepts
CO5	C	Remember	**Describe the** use of Hive Pig
CO6	C	Remember	**Define** the process of Pig.

COURSE CODE	COURSE NAME	L	T	P	C
YCA201	**BIGDATA ANALYTICS**	**3**	**1**	**0**	**4**
C:P:A 4:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Basic Computer Skills	**3**	**1**	**0**	**4**

UNIT I : Big Data and Analytics	**12**
Classification of Digital Data: Structured Data- Semi Structured Data and Unstructured Data. Introduction to Big Data: Characteristics – Evolution – Definition - Challenges -with Big Data - Other Characteristics of Data - Big Data - Traditional Business -Intelligence versus Big Data - Data Warehouse and Hadoop. Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments – Basically Available Soft State Eventual Consistency - Top Analytics Tools	

UNIT II : Technology Landscape	**12**
NoSQL, Comparison of SQL and NoSQL, Hadoop - RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop -Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem	

UNIT III : MONGODB and MAPREDUCE Programming	**12**
MongoDB: Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language. MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting– Compression	

UNIT IV: HIVE	**12**

Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile - Implementation - Hive User Defined Function - Serialization and Deserialization

UNIT V: PIG	12

Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Parameter Substitution – Diagnostic Operator - Word Count Example using Pig.

	LECTURE	TUTORIAL	TOTAL
	60	-	60

TEXT

1. A.K. Sharma, "Data Structures using C", Pearson Education, 2013

2. Robert L. Kruse"Data Structures and Program Design in C, Pearson Education, 2013

3. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C.Stein, "Introduction to Algorithms", 3rd Edition, MIT Press, 2009.

4. S. Lipschutz and G.A.V. Pai, "Data Structures", Tata McGraw-Hill, 2010.

REFERENCES

1. Robert L Kruse: Data Structures and program designing using C, 2013.

2. Kamthane: Introduction to Data Structures in C, Pearson Education, 2005

3. M.A.Weiss, "Data Structures and Problem Solving using Java", 4th Edition, Addison Wesley, 2009.

4. D. Samanta, "Classic Data Structures", 2nd Edition, PHI, 2009.

5. P. Brass, "Advanced Data Structures", Cambridge University Press, 2008

E REFERENCES

1. NPTEL, Data structures and algorithm ,Prof. Hema A Murthy,IITMadras,Prof. Shankar Balachandran,IITMadras,Dr. N S. Narayanaswamy,IIT Madras

2. NPTEL, Data structures and algorithm ,Prof. Naveen Garg,IIT Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

<p style="text-align: center;">**YCA203   ADVANCED DATA STRUCTURES**</p>

Course Outcomes:

CO1	C	Remember	**Find** out the importance of Abstract Data Types
CO2	C	Remember	**Define** the structure of Algorithm Analysis
CO3	C	Remember	**Define** trees and its representation
CO4	C	Remember	**List** out various searching and sorting algorithms
CO5	C	Remember	**Describe** the concept of sorting.
CO6	C	Remember	**Define** the features and applications of Graphs.

COURSE CODE	COURSE NAME	L	T	P	C
YCA203	**ADVANCED DATA STRUCTURES**	3	1	0	4
C:P:A 4:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Fundamentals	3	1	0	4

UNIT I : STACK & QUEUE	12
Introduction-Contiguous implementation of stack-Various operation on stack-various Polish Notations-prefix, postfix, infix, Conversion from one to another - using stack- Evaluation of post & prefix expression. Contiguous implementation of Queue- Linear queue, its drawback- Circular queue-Various operations on queue- Linked implementation of Stack and Queue operations	

UNIT II : GENERAL LIST	12
List and its contiguous implementation, its drawback; Singly linked list-operations on it; doubly linked list- operations on it; Circular linked lists: Josephoes Problem; Linked list using arrays, polynomial Arithmetic: addition, Subtraction and Evaluation, Linked Stack and Queues.	

UNIT III : TREES AND ITS REPRESENTATION	12
Definitions- Height, depth, order, degree, parent & children relationship etc-Binary Tree-Various theorems, complete binary tree, almost complete binary tree; Tree Traversals-preorder, in order & post order traversals, their recursive and non recursive implementations- Expression tree-evaluation; Linked representations of binary tree operations. Threaded binary- trees; Forrest, Conversion of the forest into tree Heap definition.	

UNIT IV: SEARCHING, HASHING & SORTING	12
Requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search, Hashing- Basics, methods, collision, resolution of collision, chaining; Internal Sorting-bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous lists, shell sort, heap sort, tree sort.	

UNIT V GRAPH	12

Related definitions; Graph representations- adjacency matrix, adjacency list, adjacency multi-list- Traversal schemes depth-first search, breadth first search; Minimum spanning tree; Shortest path algorithm; Kruskal & Dijkstra algorithms. Miscellaneous features: Basic idea of AVL Tree- Definition, insertion & deletion operation; Basic idea of B-tree definition, order, degree, insertion & deletion operations- B+-tree-definition, comparison with B-tree; Basic idea of string processing.

	LECTURE	TUTORIAL	TOTAL
	60	-	60

TEXT

1. A.K. Sharma, "Data Structures using C", Pearson Education, 2013
2. Robert L. Kruse"Data Structures and Program Design in C, Pearson Education, 2013
3. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C.Stein, "Introduction to Algorithms", 3rd Edition, MIT Press, 2009.
4. S. Lipschutz and G.A.V. Pai, "Data Structures", Tata McGraw-Hill, 2010.

REFERENCES

5. Robert L Kruse: Data Structures and program designing using C, 2013.
6. Kamthane: Introduction to Data Structures in C, Pearson Education, 2005
7. M.A.Weiss, "Data Structures and Problem Solving using Java", 4th Edition, Addison Wesley, 2009.
8. D. Samanta, "Classic Data Structures", 2nd Edition, PHI, 2009.
9. P. Brass, "Advanced Data Structures", Cambridge University Press, 2008

E REFERENCES

10. NPTEL, Data structures and algorithm ,Prof. Hema A Murthy,IITMadras,Prof. Shankar

Balachandran,IITMadras,Dr. N S. Narayanaswamy,IIT Madras

11. NPTEL, Data structures and algorithm ,Prof. Naveen Garg,IIT Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

YCA204   OBJECT ORIENTED PROGRAMMING LANGUAGE

Course Outcomes:

CO1	C	Remember	**Find** out the importance of Object Oriented Programming Concept.
CO2	C	Remember	**Define** the overview of JAVA.
CO3	C	Remember	**Discuss** about control statements of JAVA.
CO4	C	Remember	**List out** String functions in Java.
CO5	C	Remember	**Describe** the applet and swing.
CO6	C	Remember	**Comprehend** the connection between Relational Database and Java.

COURSE CODE	COURSE NAME	L	T	P	C
YCA204	**OBJECT ORIENTED PROGRAMMING LANGUAGE**	3	0	0	3
C:P:A 3:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Skills	3	0	0	3

UNIT I : OBJECT ORIENTED PROGRAMMING PARADIGM	9
Basic OOP concepts – Benefits – C++ Class definition – Member functions – Static members – Constructor and destructors: various types. Operator overloading: Unary, binary – Rules for Operator overloading – Type conversions - Function overloading – Friend and Virtual Functions. Inheritance: Various Types , Applications – Abstract classes – Virtual base classes.	

UNIT II : INTRODUCTION TO JAVA PROGRAMMING	9
An Overview of Java: Object Oriented Programming- Data Types, Variables, and Arrays: Primitive Types-Literals Variables - Type Conversion and Casting-Arrays-Operators: Control Statements-Classes and Methods – Inheritance-Exception Handling.	

UNIT III : STRING HANDLING	9
String Handling: The String Constructors - String Length - Special String -Operations - Character Extraction - String Comparison - Searching Strings -Modifying a String - Input/Output: The I/O Classes and Interfaces – File - Byte Streams - Character Streams	

UNIT IV: APPLET CLASS	9
The Applet Class: Basic Architecture - Applet Skeleton - Display methods - Status Window – Passing Parameters. Introducing GUI Programming with Swing– Introducing Swing - Swing Is Built on the WT- Two Key Swing Features - The MVC Connection - Components and Containers - The Swing Packages - A Simple Swing Application - Exploring Swing.	

UNIT V: NETWORK PROGRAMMING	9

Working with URLs- Working with Sockets - Remote Method Invocation. Introduction to Database Management Systems - Tables, Rows, and Columns - Introduction to the SQL SELECT Statement - Inserting Rows - Updating and Deleting Existing Rows - Creating and Deleting Tables -Creating a New Database with JDBC - Scrollable Result Sets

	LECTURE	TUTORIAL	TOTAL
	45	-	45

TEXT

1. Herbert Schildt, "Java the Complete Reference", 10th edition, McGraw Hill Publishing

Company Ltd, New Delhi, 2017.

2. Tony Goddis, "Starting out with Java from Control Structures Through Objects" 6th Edition,

Pearson Education Limited, 2016

REFERENCES

1. Herbert Schildt, Dale Skrien, "Java Fundamentals – A Comprehensive Introduction", TMGH

Publishing Company Ltd, New Delhi, 2013

2. John Dean, Raymond Dean, "Introduction to Programming with JAVA –A Problem Solving

Approach", TMGH Publishing Company Ltd, New Delhi,2012.

E REFERENCES

1.https://nptel.ac.in/courses/106/105/106105191/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

YCA206   BIG DATA ANALYTICS LABORATORY

Course Outcomes:

CO1	C	Applying	*Develop* the program by using the concept of fundamental techniques for handling the big data tools
CO2	C	Applying	*Create* the programs using tools required to manage big data.
CO3	C	Applying	*Create* the programs using Map reduce algorithm
CO4	C	Applying	*Create* the program by using Hadoop, MapReduce, Hive, and Pig
CO5	C	Applying	*Build* the program for fundamental principles in achieving big data analytics with scalability and streaming capability
CO6	C	Applying	*Implement* the concept of Mongo DB

COURSE CODE	COURSE NAME	L	T	P	C
YCA206	**BIG DATA ANALYTICS LABORATORY**	**0**	**0**	**4**	**2**
C:P:A 2:0:0					
		L	**T**	**P**	**H**
		0	**0**	**4**	**4**
PREREQUISITE	Basic Computer Fundamentals				

LAB EXERCISES	30

1. Implement File System Shell Commands for HDFS in Hadoop Environment
2. Write a Mapreduce program using single reduce function for finding Maximum and Minimum Number
3. Write a Mapreduce program using multiple reduce function for Word Count in an given Text document
4. Implement the following using Pig Latin Input and Output Operations Relational Operations
5. Implement the following using Pig Latin User Defined Functions Advanced Relational Operations
6. Write a Word Count program using Pig Latin Script
7. Write a program to find a maximum temperature using Pig Latin Script
8. Implement the following using Hive commands Handling the Database
9. Creating and Manipulating table

10. Implement Simple Queries for database using Mongo
11. Implement Simple Queries for collections using Mongo

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	-	-	30	30

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

YCA207   **OBJECT ORIENTED PROGRAMMING LANGUAGE LABORATORY**

Course Outcomes:

CO1	C	Applying	***Develop*** the program by using the concept of object-oriented concepts in JAVA
CO2	C	Applying	***Create*** the programs using concepts Exception handling.
CO3	C	Applying	***Create*** the program by using Applet
CO4	C	Applying	***Build*** the program for Network communication
CO5	C	Applying	***Implement*** the concept of JDBC
CO6	C	Applying	***Implement*** Java beans

COURSE CODE	COURSE NAME	L	T	P	C
YCA207	**OBJECT ORIENTED PROGRAMMING LANGUAGE LABORATORY**	**0**	**0**	**4**	**2**
C:P:A 2:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Basic Computer Fundamentals	**0**	**0**	**4**	**4**

LAB EXERCISES	**30**

1. Implementation of Exception handling concepts in C++
2. Build a Swing application to implement metric conversion.
3. Use Grid Layout to design a calculator and simulate the functions of a simple calculator.
4. Create a Color palette with a matrix of buttons using Applet.
   - To invoke a servlet from HTML forms.
   - To invoke servlet from Applets.
   - To invoke servlet from JSP.
5. Implement message communication using Network Programming.
6. Write a program to connect databases using JDBC.
7. Simple program using Sockets

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	-	-	30	30

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

YCA208   DATA VISUALISATION LABORATORY

Course Outcomes:

CO1	C	Applying	**_Develop_** the program by using the concept of basic functions of Excel and tableau
CO2	C	Applying	**_Develop_** the program by using the concept of basic operations of Excel and tableau
CO3	C	Applying	**_Explore_** to design, build, and deploy various charts for applications
CO4	C	Applying	**_Create_** the program by using comprehend, design and deploy the label
CO5	C	Applying	**_Create_** the program by using heat map
CO6	C	Applying	**_Build_** the program for understand and deploy dashboard

COURSE CODE	COURSE NAME	L	T	P	C
YCA208	**DATA VISUALISATION LABORATORY**	**0**	**0**	**4**	**2**
C:P:A 2:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Basic Computer Skills	**0**	**0**	**4**	**4**

LAB EXERCISES	**30**

1. Implement the following using Excel
   1. Create Pie chart for Sales and Sales % by Country (sorted in descending order)
   2. Create Bar chart for Sales by Country by Year (rounded to nearest thousand and sorted by Grand Total)
   3. Create Line char for Sales by Ship Mode (First Class, Same Day, Second Class and Standard Class)
   4. Create Scatter chart for Sales by Ship Mode by Country (rounded to the nearest dollar and sorted by First Class)
   5. Create heat map for Sales by Category by Sub-Category (in thousands and sorted by sales value in descending order)
   6. Design and create the label for vendor list
   7. Design and create the dash board

2. Implement the following using Tableau

    1. Sales by Ship Mode (First Class, Same Day, Second Class and Standard
    Class)
    2.Sales by Ship Mode by Country (rounded to the nearest dollar and sorted
    by First Class)
    3. Sales by Category by Sub-Category (in thousands and sorted by sales
    value in descending order

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	-	-	30	30

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

YCA301 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Course Outcomes:

CO1	C	Understand	*List out* various methods to define AI techniques
CO2	C	Understand	*Explain* set theory and Relations
CO3	C	Understand	*List out* various counting and Predicate Logic
CO4	C	Understand	*Interpret* the problems in Probabilistic reasoning
CO5	C	Understand	*Discuss* Concept of learning the expert systems
CO6	C	Understand	*Interpret* various case studies of expert systems

COURSE CODE	COURSE NAME	L	T	P	C
YCA301	**Artificial Intelligence and Machine Learning**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		3	**0**	**0**	**3**

UNIT –I: AI Techniques	9
AI techniques-search knowledge, abstraction- natural language processing- vision and speech processing- Games-theorem proving- robotics - expert systems.	

UNIT -II : State Space Search	9
State space search: Production systems- Search space control: Depth first, breadth first search, heuristic search - Hill climbing - best first search - branch and bound.	

UNIT- III: Predicate Logic	9
Minimax search: Alpha-Beta cut offs- Predicate Logic : Skolemizing queries - Unification. Modus pone - Resolution - dependency directed backtracking	

UNIT- IV: Backtracking	9
Rule Based Systems-Forward reasoning-Conflict resolution-Backward reasoning- Use of no backtrack-Structured Knowledge Representations- Semantic Net-slots, exceptions and defaults Frames- Probabilistic reasoning-Use of certainty factors-Fuzzy logic.	

UNIT- V: Expert Systems	9
Concept of learning-learning automation-genetic algorithm- learning by induction-neural netsback propagation-Need and justification for expert systems- Knowledge acquisition-Case studies: MYCIN, RI.	

	LECTURE	TUTORIAL	TOTAL
	45	**0**	**45**

TEXT
1. Stuart J.Russell and Peter Norvig., "Artificial Intelligence- A Modern Approach", Pearson-3rd edition, 2010.

REFERENCES

1. Nilsson, N.J., "Principles of AP', Narosa Publishing House, 1990.
2. Patterson, D. W., "Introduction to AI and Expert Systems", Prentice Hall of India, 1992.
3. Peter Jackson, "Introduction to Expert Systems", Addison Wesley Publishing Company, M.A., 1992
4. Rich, E., and Knight, K., "Artificial Intelligence", Tata McGraw Hill (2nd Edition), 1992.
5. Schalk off, R.J., "Artificial Intelligence • An Engineering Approach", McGraw Hill International Edition, Singapore, 1992.
6. Sasikumar, M., Ramani, S., "Rule Based Expert System", Narosa Publishing House,1994.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
CO 6	3	2	2	2	2	1	2	2	2	2
Total	17	15	12	12	12	6	12	12	15	15
Course	3	3	2	2	2	1	2	2	3	3

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA302 COMPUTER GRAPHICS AND MULTIMEDIA

Course Outcomes:

CO1	C	Remember	***Describe*** two dimensional graphics.
CO2	C	Understand	***Illustrate*** two dimensional transformations
CO3	C	Remember	***Explain*** three-dimensional graphics
CO4	C	Understand	***Discuss*** Illumination and colour models.
CO5	C	Understand	***Summarize*** the interface using Multimedia authoring .
CO6	C	Understand	***Define*** Basic 3d Scenes using Blender

COURSE CODE	COURSE NAME	L	T	P	H	C
YCA302	**COMPUTER GRAPHICS AND MULTIMEDIA**	3	0	0	3	3
C:P:A 3:0:0						
		L	T	P	H	C
PREREQUISITE	Basic Computer Skills	3	0	0	3	3
UNIT -I : ILLUMINATION AND COLOR MODELS						9

Light sources — basic illumination models — halftone patterns and dithering techniques; Properties of light — Standard primaries and chromaticity diagram; Intuitive colour concepts — RGB colour model — YIQ colour model — CMY colour model — HSV colour model — HLS colour model; Colour selection. Output primitives — points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.

UNIT- II: TWO-DIMENSIONAL GRAPHICS	9

Two dimensional geometric transformations — Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing — viewing pipeline, viewing coordinate reference frame; window-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations — point, line, and polygon clipping algorithms.

UNIT- III: THREE-DIMENSIONAL GRAPHICS	9

Three dimensional concepts; Three dimensional object representations — Polygon surfaces-Polygon tables- Plane equations — Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations — Bezier curves and surfaces -B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations — Translation, Rotation, Scaling, composite transformations; Three dimensional

viewing — viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

UNIT- IV: MULTIMEDIA SYSTEM DESIGN & MULTIMEDIA FILE HANDLING	9

Multimedia basics – Multimedia applications – Multimedia system architecture – Evolving technologies for multimedia – Defining objects for multimedia systems – Multimedia data interface standards – Multimedia databases. Compression and decompression – Data and file format standards – Multimedia I/O technologies – Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval technologies.

UNIT V: HYPERMEDIA	9

Multimedia authoring and user interface — Hypermedia messaging -Mobile messaging – Hypermedia message component – Creating hypermedia message – Integrated multimedia message standards – Integrated document management – Distributed multimedia systems. Case Study: Blender Graphics. Blender Fundamentals — Drawing Basic Shapes — Modelling — Shading & Textures

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	0	0	45

TEXT BOOKS

1.Computer Graphics and Multimedia-Atul P. Godse, Dr. Deepali A. Godse-Technical Publications, 2021

2. Donald Hearn and Pauline Baker M, ―Computer Graphics", Prentice Hall, New Delhi, 2007

REFERENCES

1.Foley, Vandam, Feiner and Hughes, ―Computer Graphics: Principles and Practice‖, 2nd Edition, Pearson Education, 2003.

2.Jeffrey McConnell, ―Computer Graphics: Theory into Practice‖, Jones and Bartlett Publishers,2006.

3.Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, KelvinSung, and AK Peters, ―Fundamentals of Computer Graphics‖, CRC Press, 2010.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA305 MINI PROJECT

COURSECODE	COURSE NAME	L	T	P	C
YCA305	**Mini Project**	0	0	3	3
C:P:A = 3:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Skills	0	0	3	3

CO1   C   Apply   Identify the Requirements Analysis

CO2   C   Apply   Plan the Design for their project

CO3   C   Apply   Model for data preprocessing

CO4   C   Apply   Develop the Coding

CO5   C   Apply   Plan for Testing

CO6   C   Apply   Solve the Conclusion

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA306 INDUSTRIAL LECTURERS

COURSECODE	COURSE NAME	L	T	P	C
YCA306	INDUSTRIAL LECTURES	0	0	2	2
C:P:A = 2:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Skills	0	0	2	2

CO1   C   Apply   Examine the domain-based company and its environment

CO2   C   Apply   Associate with team members

CO3   C   Apply   Prepare the Technical Concepts

CO4   C   Apply   Solve the small problems

CO5   C   Apply   Create real time applications

CO6   C   Apply   Solve the Conclusion

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA307 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY

Course Outcomes:

CO1	C	Apply	*Manipulate* various methods to define AI techniques
CO2	C	Apply	*Starts* and apply set theory and Relations
CO3	C	Apply	*Develop* and *implement* various counting and Predicate Logic
CO4	C	Apply	*Develop* and *solve* problems in Probabilistic reasoning
CO5	C	Apply	*Build* Concept of learning the expert systems
CO6	C	Apply	*Develop case study of* DCNN

COURSE CODE	COURSE NAME	L	T	P	C
YCA307	**Artificial Intelligence and Machine Learning Laboratory**	**0**	**0**	**4**	**2**
C:P:A = 2:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Skills	0	0	4	4
Lab Exercises					30

1. Write a program to implement simple Chatbot using NLP concept of AI.

2. Write a program to implement Breadth first search traversal Algorithm with AI techniques.

3. Write a program to implement Depth first search traversal Algorithm using AI techniques.

4. Write a program to implement Tower of Hanoi Problem using AI techniques.

5. Write a program to implement Hung man game with AI techniques.

6. Write a program to implement Tic-Tac-Toe game with AI techniques.

7. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets in machine learning.

8. Write a program to implement K nearest Neighbour algorithm to classify the iris data set, print both correct and wrong predictions using Machine Learning Techniques.

9. Case Study in NLP - Text classification, parts of speech tagging and stemming from sentences.

10. Case Study in DCNN - GoogLeNet and AlexNet

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA308 COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY

Course Outcomes:

CO1	C	Applying	*Implement* Graphics functions
CO2	C	Applying	*Build* an application program using Line Drawing algorithms
CO3	C	Applying	*Develop* an application using Circle Drawing algorithms
CO4	C	Applying	*Implement* the 2D and 3D transformations
CO5	C	Applying	*Apply* the Key frame animation
CO6	C	Applying	**Apply** the path animation

COURSE CODE	COURSE NAME	L	T	P	C
YCA308	**COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY**	**0**	**0**	**4**	**2**
C:P:A = 2:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Skills	**0**	**0**	**4**	**4**
Lab Exercises					**30**

1. Implement Fundamental Graphics Functions.
2. Implementation of Line drawing algorithms: DDA Algorithm, Bresenham's Algorithm
3. Implementation of Circle drawing algorithms: Bresenham's Algorithm, Mid-Point Algorithm.
4. Programs on 2D and 3D transformations
5. Write a program to implement Cohen Sutherland line clipping algorithm
6. Write a program to draw Bezier curve.
7. Using Flash/Maya perform different operations (rotation, scaling move etc..) on objects
8. Create a Bouncing Ball using Key frame animation and Path animation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA401 REVIEW OF LITERATURE

COURSECODE	COURSE NAME	L	T	P	C
YCA401	REVIEW OF LITERATURE	0	0	3	3
C:P:A = 3:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Skills	0	0	3	3

CO1   C   Guided Response   Experiment with domain

CO2   C   Guided Response   Identifying the Topic

CO3   C   Guided Response   Preparing the content/Arranging the Seminar

CO4   C   Guided Response   Presenting the content

CO5   C   Guided Response   Addressing the Audience

CO6   C   Guided Response   Answer the Question

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	2	3	3
CO 2	2	2	2	2	2	2	2	2	3	3
CO 3	2	2	2	2	2	2	2	2	3	3
CO 4	2	2	2	2	2	2	2	2	3	3
CO 5	2	2	2	2	2	2	2	2	3	3
Total	10	10	10	10	10	10	10	10	15	15
Course	3	2	2	2	2	2	2	2	3	3

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCA402 MAIN PROJECT

COURSECODE	COURSE NAME	L	T	P	C
YCA402	**Main Project**	0	0	24	11
C:P:A = 11:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Skills	0	0	24	24

CO1   C   Apply   Identify the Requirements Analysis

CO2   C   Apply   Plan the Design for their project

CO3   C   Apply   Model for data preprocessing

CO4   C   Apply   Develop the Coding

CO5   C   Apply   Plan for Testing

CO6   C   Apply   Solve the Conclusion

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

COURSE CODE			COURSE NAME		L	T	P	C
YCAME2A			**OPTIMIZATION TECHNIQUES**		3	0	0	3
C	**P**	**A**			L	T	P	H
3	**0**	**0**			3	0	0	3

PREREQUISITE:NIL

COURSE OUTCOMES:

Course outcomes:	Domain	Level
CO1: Solve linear programming problems using Gomary Cutting – Plane Method and Branch and Bound Techniques	Cognitive	Applying
CO2: Analyzing queuing models by applying the basic characteristic features of a queuing system.	Cognitive	Analysing
CO3: Decide an optimal replacement period/policy for a given item/equipment/machine.	Cognitive	Evaluating
CO4: Explain the need of inventory management.	Cognitive	Understanding
CO5: Solve two person zero sum game by applying Dominance property	Cognitive	Applying
CO6: Solve two person zero sum game by applying graphical method.	Cognitive	Applying

UNIT- I: Integer Programming	**9**
Pure and Mixed Integer Programming Problems – Gomary Cutting – Plane Method – Fractional and Mixed Algorithms – Branch and Bound Techniques	
UNIT- II: Queuing Theory	**9**
Queuing System – Characteristics of Queuing System – Classification of Queues – M/M/1 and M/M/C queuing Models.	
UNIT- III: Replacement Model	**9**
Replacement Problem – Replacement of Items that Deteriorate with time – Replacement of Items that Fail Completely.	
UNIT- IV: Inventory Theory	**9**
ABC Analysis – Economic Lot Size Problems – EOQ with Shortage – Multi–Item Deterministic Problem – Uncertain Demand – Inventory Control with Price Breaks.	
UNIT- V: Game Theory	**9**
Introduction – Maximin and minimax criteria of optimality –Dominance property – Arithmetic method for 2 x 2 games – Solution of 2 x n or m x 2 games	

	LECTURE	TUTORIAL	TOTAL

		45	0	45

TEXT BOOKS

1. HamdyA.TAHA.,"Operations research- An Introduction", 8thedition, Pearson Education,Inc,2007.
2. KantiSwarup, Gupta, P.K., and Man Mohan, "Operations Research", Sultan Chand & Sons-New Delhi. 1990.

REFERENCES

1. Karnbo, N.S., "Mathematical Programming Techniques", McGraw Hill, New York. 1985.
2. Mital K. V., "Optimization Methods In Operations Research and System Analysis", New Age International (P) Ltd., New Delhi, 1992.
3. Saffer, L.R., Fitter J.B., and MeyerW.L., "The Critical Path Method". McGraw Hill. New York. 1990.
4. Gillet, B.E., "Introduction to Operations Research: A Computer Oriented Algorithmic Approach". Tata McGraw Hill, New York, 1990.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	2	0	1	1	1	1	1	0	0
CO 2	3	3	1	2	1	1	1	1	0	0
CO 3	3	3	2	3	1	1	1	1	0	0
CO 4	2	1	0	0	1	1	1	1	0	0
CO 5	3	2	0	1	1	1	1	1	0	0
CO 6	3	2	0	1	1	1	1	1	0	0
Total	17	13	3	8	6	6	6	6	0	0
Scaled Value	3	3	1	2	2	2	2	2	0	0

5 – 9 → 1,   10 – 14 → 2,   15 – 18 → 3
0-No relation 3- Highly relation   2- Medium relation   1- Low relation

COURSE CODE			COURSE NAME	L	T	P	C
YCAME2B			AUTOMATA THEORY	3	0	0	3
C	P	A					
3	0	1		L	T	P	H
				3	0	0	3

PREREQUISITE: Analysis

COURSE OUTCOMES:

Course outcomes:	Domain	Level
CO1: Define and Explain Strings, Alphabets and Languages	Cognitive	Understanding
CO2: Define and Explain Regular expressions and Properties of Regular sets.	Cognitive	Understanding
CO3: Define and Explain Context Free grammars	Cognitive	Understanding
CO4: Define and Explain Pushdown Automata & properties of Context free languages	Cognitive	Understanding
CO5: Define and Explain Turning Machine and Chomski hierarchy.	Cognitive	Understanding
CO6: Explain Chomski hierarchy.	Cognitive	Understanding

UNIT I	9
Strings, Alphabets and Languages (Section 1.1 of the Text) Finite Automata (Chapters 2, Sections 2.1 to 2.4)	
UNIT II	9
Regular expressions and Properties of Regular sets.(Sections 2.5 to 2.8 and 3.1 to 3.4)	
UNIT III	9
Context Free grammars (Section 4.1 to 4.5)	
UNIT IV	9
Pushdown Automata & properties of Context free languages Theorem 5.3, 5.4 (without proof), (Section is 5.1 to 5.3 and 6.1 to 6.3)	
UNIT V	9
Turning Machine and Chomski hierarchy, (Sections 7.1 to 7.3 and 9.2 to 9.4)	

	LECTURE	TUTORIAL	TOTAL
	45		45

TEXTBOOK

1. J.E. Hopocroft and J.D. Ulman, Introduction to Automata Theory Languages and Computation, Narosa, 1999.

REFERENCES

1. G.ERevesz,Introduction to Formal Languages
2. P.Linz,Introduction to Forma Languages and Automata,Narosa2000
3. G.Lallment, Semigroups and Applications.

COs VS POs

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	2	1	0	0	1	1	1	1	0	0
CO 2	2	1	0	0	1	1	1	1	0	0
CO 3	2	1	0	0	1	1	1	1	0	0
CO 4	2	1	0	0	1	1	1	1	0	0
CO 5	2	1	0	0	1	1	1	1	0	0
CO6	2	1	0	0	1	1	1	1	0	0
TOTAL	12	6	0	0	6	6	6	6	0	0
SCALED VALUE	2	1	0	0	1	1	1	1	0	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation										
5 – 9 → 1, 10 – 14 → 2, 15 – 18 → 3										

COURSE CODE			COURSE NAME		L	T	P	C
YCAME2C			**NUMERICAL METHODS**		3	0	0	3
C	P	A			L	T	P	H
3	0	0			3	0	0	3

PREREQUISITE: NIL

COURSE OUTCOMES:

Course outcomes:	Domain	Level
CO1: Solve the algebraic equations and transcendental equations using iteration method and Newton Raphson method and to find the solution of linear system of equations using direct method and indirect method.	Cognitive	Applying
CO2: Interpret the value of the curve y = f(x) using interpolation and approximation method.	Cognitive	Analysing
CO3: Evaluate numerical integration using Trapezoidal, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.	Cognitive	Evaluating
CO4: Solve first order initial value problems using single step methods**.**	Cognitive	Applying
CO5: Solve first order initial value problems using single step methods**.**	Cognitive	Applying
CO6: Solve first order initial value problems using multistep methods**.**	Cognitive	Applying

UNIT- I: Solution of algebraic and transcendental equations	9
Solution of algebraic and transcendental equations - Fixed point iteration method – Newton-Raphson method- Solution of linear system of equations - Gauss Elimination method –Gauss-Jordan methods – Iterative methods of Gauss-Jacobi and Gauss-Seidel.	
UNIT- II: Interpolation and Approximation	9
Interpolation with equal intervals - Newton's forward and backward difference formulae- Interpolation with unequal intervals - Lagrange interpolation – Newton's divided difference interpolation.	
UNIT- III: Numerical Differentiation and Integration	9
Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 and Simpson's 3/8 rules.	
UNIT- IV: Initial Value Problems for Ordinary Differential Equations	
Single step-methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first and second order equations	

UNIT- V: Initial Value Problems for Ordinary Differential Equations		9

	LECTURE	TUTORIAL	TOTAL
	45	0	45

Multi-step methods - Milne's and Adams-Bash forth predictor-corrector methods for solving first order equations.

TEXT BOOKS

1. Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", 6th Edition, Khanna Publishers, New Delhi, (2013).
2. Jain M.K. , Iyengar S.R.K, Jain R.K, "Numerical Methods problems and solutions", Revised Second Edition (2019).

REFERENCES

1.V. Rajaraman , Computer oriented numerical methods , PHI Pub(2013).
2. E. Balagurusamy, Numerical methods ,copyright 1999 by Tata MC Graw Hill,25th (2008)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	2	0	1	1	1	1	1	0	0
CO 2	3	3	1	2	1	1	1	1	0	0
CO 3	3	3	2	3	1	1	1	1	0	0
CO 4	3	2	0	1	1	1	1	1	0	0
CO 5	3	2	0	1	1	1	1	1	0	0
CO6	3	2	0	1	1	1	1	1	0	0
Total	18	14	3	9	6	6	6	6	0	0
Scaled Value	3	3	1	2	1	1	1	1	0	0

5 – 9 → 1, 10 – 14 → 2, 15 – 18 → 3
0-No relation 3- Highly relation 2- Medium relation 1- Low relation

COURSE NAME		COMBINATORICS		L	T	P	C
COURSE CODE		YCAME2D		3	0	0	3
C	P	A		L	T	P	H
3	0	0		3	0	0	3
PREREQUISITE		Basics of sets					

On successful completion of this course, the students will be able to:

COURSE OUTCOMES		DOMAIN	LEVEL
CO 1	**Explain** the distributions of distinct objects and non-distinct objects	Cognitive	Understanding
CO 2	**Apply** diverse counting strategies to solve varied problems involving strings, combinations, distributions, and partitions	Cognitive	Applying
CO 3	**Solve** linear recurrence relations by recognizing homogeneity, linearity, constant coefficients, degree, and characteristic equation	Cognitive	Applying
CO 4	**Identify** the number of permutations with forbidden positions using rook polynomials	Cognitive	Applying
CO 5	**Apply** Polya's theorem for finding number of permutations of given objects	Cognitive	Applying
CO6	**Analyse** Weights and inventories of functions	Cognitive	Analyse

UNIT 1	**Permutations and combinations**	9

Distributions of distinct objects – Distributions of non-distinct objects – Stirling's formula.

UNIT 2	**Generating functions**	9

Generating function for combinations – Enumerators for permutations distributions of distinct objects into non distinct cells – partitions of integers – Ferrer's graphs – Elementary relations.

UNIT 3	**Recurrence relation**	9

Linear recurrence relations with constant coefficients- solutions by the technique of generating functions – A special class of nonlinear difference equations – Recurrence relations with two indices.

UNIT 4	**The principle of inclusion and exclusion**	9

General formula – Permutations with restriction on relative positions – Derangements – Rook polynomials – permutations with forbidden positions.

UNIT 5	Polya's theory of counting							9

Equivalence classes under a permutation group – Burnside theorem – Equivalence classes of functions – Weights and inventories of functions – Polya's fundamental theorem – Generalization of Polya's theorem

LECTURE	45	TUTORIAL	0	PRACTICAL	0	TOTAL	45

TEXT BOOKS

1. Cameron, P.J. (1998) Combinatorics: Topics, Techniques, Algorithms. Cambridge: Cambridge University Press.
2. Liu, C.L., Eddberg, M. (1968), Solutions to problems in Introduction to Combinatorial Mathematics. New York: McGraw-Hill Book & Co.

REFERENCES

1. Liu, C.L. (1968). Introduction of Combinatorial Mathematics. New York: McGraw Hill Book Co.
2. Stanley, R.P. (1997). Enumerative Combinatorics, Volume I, Cambridge Studies in Advanced Mathematics, Volume 49. Cambridge University Press.

COs VS POs

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	2	1	0	0	1	1	1	1	0	0
CO 2	3	2	0	1	1	1	1	1	0	0
CO 3	3	2	0	1	1	1	1	1	0	0
CO 4	3	2	0	1	1	1	1	1	0	0
CO 5	3	2	0	1	1	1	1	1	0	0
CO6	3	3	1	2	1	1	1	1	0	0
TOTAL	17	12	1	6	6	6	6	6	0	0
SCALED VALUE	3	2	1	1	1	1	1	1	0	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation										
5 – 9 → 1, 10 – 14 → 2, 15 – 18 → 3										

YCABE5A - FOUNDATIONS OF DECISION PROCESSES

Course Outcomes:

CO1	C	Remember	*Define* various methods to define role of decision making
CO2	C	Understand	*Summarize* game theory and competitive strategies
CO3	C	Remember	*Describe* various queuing and inventory models
CO4	C	Understand	*Describe* problems in Finance.
CO5	C	Understand	*Understand* Systematic problem analysis
CO6	C	Understand	*Interpret* various case studies using decision making

Course Code	Course Name	L	T	P	C
YCABE5A	**Foundations of Decision Processes**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Business Skill	**3**	**0**	**0**	**3**
UNIT- I:-Decision Making					**9**
Role of decision making in management-Framework-Criteria under conditions of certainty- risk and uncertainty-Baytes theorem-Sequential decision making decision tree analysis.					
UNIT –II: Competitive Strategies					**9**
Theory of utility- Utility function curve- Competitive strategies, game theory- Queuing model- Single channel, single phase waiting line model with Poisson.					
UNIT- III: Simulation					**9**
Distributed arrival rates and exponentially distributed service times-Markov models-Simulation: Monte Carlo- Application to queuing and inventory models-Applications in functional areas of marketing, production.					
UNIT- IV: Finance					**9**
Finance- Behavioral aspects in decision making-open and closed models of decisions.					
UNIT –V: Systematic Problem Analysis					**9**
Systematic problem analysis and decision making- Decision making in functional areas - case studies.					
		LECTURE	**TUTORIAL**		**TOTAL**
		45	**0**		**45**

TEXT
1. Gregory, G. "Decision analysis", Pitman, London, .1988.
2. Johnson. R.D .. et. al. "Quantitative Techniques filr Business Decisions". Prentice Hall. N.J ..1977.

REFERENCES
1. Ronald A. Howard, Ali E. Abbas, "*Foundations of Decision Analysis"*.Pearson,. 2016.
2. David C.skinner.,"Introduction to decision analysis", 3rd edition, Apractitioner's guide to improving decision quality, 1999.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	2	1	1	2	1	1	1	2	2
CO 5	2	2	1	1	2	1	1	1	2	2
Total	12	10	6	6	12	6	6	6	12	12
Course	2	2	1	1	2	1	1	1	2	2

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCABE5B - CORPORATE PLANNING

Course Outcomes:

CO1	C	Knowledge	*Describe* various methods to define *Corporate Planning and Budgeting*
CO2	C	Understand	*Understand Social Responsibilities*
CO3	C	Knowledge	*Describe* various *Professionalism*
CO4	C	Understand	*Describe* problems in *Mission and Purpose*
CO5	C	Understand	*Understand* Concept of learning the *Organisation Appraisal*
CO6	C	Understand	*Describe the* gaps in *planning of an organisation.*

COURSE CODE	COURSE NAME	L	T	P	C
YCABE5B	**Corporate Planning**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	T	P	H
PREREQUISITE	Business Skill	3	0	0	3

UNIT- I: Corporate Planning and Budgeting	**9**
Significance of Planning: Types-Needs-Requisites-Corporate planning: system approach-Role of the planner-Corporate planning and budgeting.	
UNIT- II: Social Responsibilities	**9**
Social responsibilities: Scope, contents, cooperation and society, consumers, corporation and democracy, community-government.	
UNIT- III: Professionalism	**9**
Social responsibility-versus profitability-productivity-growth-Professionalism as a means of social bahaviour.	
UNIT- IV: Mission and Purpose	**9**
Mission and purpose: Business definitions - objectives and goals-Environment appraisal: Concepts, components-Scanning and appraising the environment.	
UNIT- V: Organisation Appraisal	**9**
Organization appraisal: Dynamics-capability factors- Considerations- Methods and techniques- Structuring- Planning gaps: Gap analysis- Manager audit: Significance of gaps.	

	LECTURE	TUTORIAL	TOTAL
	45	**0**	**45**

	TEXT
	1.Kazni. A .. "Business Policy". Tata McGraw Hill. New Delhi, 1992.
	2.Johnson. G .. etal. 3rd edition. "Exploring corporate Strategy", Prentice Hall of India, New Delhi. 1994.
	REFERENCES
	1.CA.(Dr.)K.M. Bansal "Corporate Accounting". Taxmann.S. University of Delhi**.**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	1	1	1	2	1	1	1	2	2
CO 6	2	1	1	1	2	1	1	1	2	2
Total	12	9	6	6	12	6	6	6	12	12
Course	2	1	1	1	2	1	1	1	2	2

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCABE5C MANAGEMENT OF SOFTWARE PROJECTS

Course Outcomes:

CO1	C	Knowledge	*Describe* various methods to define Software projects
CO2	C	Understand	*Understand* the project scheduling and project management.
CO3	C	Knowledge	*Describe* system life cycle
CO4	C	Understand	*Describe* the problems related to the project
CO5	C	Understand	*Understand* and determine skill requirements
CO6	C	Understand	*Explain* reporting and presentation techniques

Course Code	Course Name	L	T	P	C
YCABE5C	**Management of Software Projects**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Business Skill	3	0	0	3
UNIT- I:-Introduction					**9**
Managerial Issues in Software Projects-Introduction to software markets-Planning of software projects-Size and Cost Estimations.					
UNIT –II: Project Scheduling and Management					**9**
Project Scheduling-Measurement of software quality and productivity-ISO and Capability Maturity Models for organizational growth-Project management and Practice.					
UNIT- III: System life cycle and Design					**9**
Managing the systems life cycle- requirements determination-logical design-physical design-testing-implementation.					
UNIT- IV: Integration issues and Project Management					**9**
System and database integration issues-metrics for project management and systems performance evaluation-managing expectations- superiors-users-team members and other related to the project.					
UNIT- V: Cost Effectiveness Analysis					**9**
Determining skill requirements and staffing the project-cost-effectiveness analysis-reporting and presentation techniques-and effective management of both behavioural and technical aspects of the project.					

		LECTURE	TUTORIAL	TOTAL
		45	**0**	**45**

TEXT

1. Gilb, T., "Principles of Software Engineering Management", Addison Weskey. Reading. M.A. 1988.

2. Putnam. L.H . Myers. W., "Industrial Sire"'" Software - Effective Management using Measurement". IEEE C.S. Press. 1997.

REFERENCES

1. Dr.Jeroen Arnoldus, Dr.Sieuwert Van Otterloo, Dr.Joost Schalken-Pinkster, "Software Project Management", ICT Institute

2. Lean Agile and Kanban , " Software Engineering Management", on Pawel Brodzinski

3. "Principles of Software Development Leadership: Applying Project Management Principles to Agile Software Development" by Ken Whitaker.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	1	1	1	2	1	1	1	2	2
CO 6	2	1	1	1	2	1	1	1	2	2
Total	12	9	6	6	12	6	6	6	12	12
Course	2	1	1	1	2	1	1	1	2	2

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCABE5D ENTERPRISE RESOURCE PLANNING

Course Outcomes:

CO1   C   Understand   *Explain* the functionalities of Enterprise resource planning

CO2   C   Understand   *Characterize* the ERP implementation procedures

CO3   C   Remember   *Describes* the elements of ERP

CO4   C   Understand   *Differentiate* the available ERP packages

CO5   C   Understand   *Interpret* integration process of ERP

CO6   C   Understand   *Summarize* the models of ERP with other related technologies

COURSE CODE	COURSE NAME	L	T	P	C
YCABE5D	**ENTERPRISE RESOURCE PLANNING**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	T	P	H
PREREQUISITE	Business Skill	3	0	0	3

UNIT -I : INTRODUCTION	9
Overview - ERP essentials, Benefits, ERP evolution, ERP market, ERP tiers – information systems – Business Process Re-Engineering(BPR), Presentation tier – application tier – database tier.	

UNIT- II: ENTERPRISE SYSTEMS	9
ERP Implementation Lifecycle, Implementation Methodology - Enterprise systems – stand-alone mainframe systems – client server architecture – service-oriented architecture – types of enterprise systems – types of data – SAP overview.	

UNIT- III: PROCESS IN ERP	9
Basic Procurement process – physical flow – document flow – information flow – financial impact- role of enterprise systems in the procurement process – fulfilment process – production process.	

UNIT- IV: INTEGRATION	9
Integrated processes – Integrated processes execution – additional intracompany processes – extended (intracompany) processes.	

UNIT- V: CASE STUDY AND FUTURE DIRECTIONS	9

	ERP for software industry – ERP for a hardware manufacturing company – ERP for Laptop manufacturing – ERP for furniture manufacturing company – ERP for toys manufacturing company - Mc Donald's story – ERP and e-Commerce, ERP and Internet, Future Directions.		
	LECTURE	**TUTORIAL**	**TOTAL**
	45	**0**	**45**

TEXTBOOK

1. Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2014

REFERENCES

1. Simha R Magal, Jeff Word, ―Essentials of Business Processes and Information Systems‖, Wiley Publications, 2009.

2. Marianne Bradford, ―Modern ERP: Select, Implement and use Today's advanced business systems‖, Lulu Publishers, Second Edition, 2010.

3. Jyotindra Zaveri, ―Enterprise Resource Planning‖, Second edition, Himalaya Publishing house, 2012.

E REFERENCES

1. ERP, Prof. P. K. Biswas, Dept. of Electronics and Elecrical Communication Engg., IIT, Kharagpur

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	1	1	1	2	1	1	1	2	2
CO 6	2	1	1	1	2	1	1	1	2	2
Total	12	9	6	6	12	6	6	6	12	12
Course	2	1	1	1	2	1	1	1	2	2

0-No relation 3- Highly relation   2- Medium relation   1- Low relation

YCACE3A - CLOUD COMPUTING

Course Outcomes:

CO1	C	Remember	*Characterize* the concept of Cloud Computing
CO2	C	Understand	*Identify* the architecture, infrastructure and delivery models of cloud computing
CO3	C	Remember	*Classify* various Cloud services
CO4	C	Understand	*Choose* the appropriate Programming Models and approach
CO5	C	Remember	*Identifies* the purposes of map reduce paradigms
CO6	C	Remember	*Classify* about different applications in Cloud

COURSE CODE	COURSE NAME	L	T	P	C
YCACE3A	**CLOUD COMPUTING**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	Basic Computer Skills	3	0	0	3

UNIT I CLOUD COMPUTING FOUNDATION	**9**
Introduction to Cloud Computing- Move to Cloud Computing-Types of Cloud-working of Cloud computing- Cloud Computing Technology.	

UNIT II DATA STORAGE AND VIRTUALIZATION	**9**
Data Storage-Cloud Storage- Cloud Computing frameworks-Google,EMC,Amazon and Salesforce.com. Virtualization - Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource Management – Virtualization for Data-canter Automation.	

UNIT III CLOUD SERVICES AND PROGRAMMING MODELS	**9**
Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service(IaaS) Parallel and Distributed Programming Paradigms – MapReduce, Twister and Iterative MapReduce – Hadoop Library from Apache	

UNIT IV CLOUD COMPUTING TOOLS AND TECHNOLOGIES	**9**
Grid, Cloud and Virtualization-Cloud Computing Application Platform – Tools for building cloud- Map Reduce Paradigms: Introduction, GFS Architecture, HDFS Architecture, Hbase, Google big Table, Amazon's (key value) pair storage and Microsoft's Azure infrastructure, Map reduce programming examples	

	UNIT V CLOUD APPLICATIONS	9

Google Cloud Applications-Google App Engine-Case Study: Cloud as Infrastructure for an internet-Case Study-An Enterprise with Multiple Data Centers.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT

1. Kris Jamsa , "Cloud Computing", Jones & Bartlett Learning, 2nd Edition,2022

REFERENCES

1. Syed A.Ahson, Mohammad Ilyas, Cloud Computing and Software Services-Theory and Techniques, CRC, 2011.
2. Anthony T. Velte Toby J. Velte, Ph.D. Robert Elsenpeter, Cloud Computing-A Practical Approach, The McGraw-Hill, 2010
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly

E REFERENCES

1. http://track.justcloud.com/?hash=7397.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

YCACE3B BLOCK CHAIN

Course Outcomes:

CO1	C	Remember	*Describe* the concept of block chain
CO2	C	Understand	*Explain* block chain network
CO3	C	Understand	*Classify* crypto currency and bit coin
CO4	C	Understand	*Summarize* the regulation of crypto currency
CO5	C	Understand	*Define* block chain applications
CO6	C	Understand	*Explain* about innovation in next generation industry

COURSE CODE	COURSE NAME	L	T	P	C
YCACE3B	**BLOCKCHAIN TECHNOLOGY**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	T	P	H
PREREQUISITE	Basic Computer Skills	**3**	**0**	**0**	**3**
UNIT-I: INTRODUCTION TO BLOCK CHAIN					9
Introduction, Advantage over conventional distributed database, Block chain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public block chain.					
UNIT-II: DISTRIBUTED CONENSUS					9
Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.					
UNIT – III: CRYPTOCURRENCY					9
Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin					
UNIT- IV: CRYPTOCURRENCY REGULATION AND APPLICATIONS					9
Cryptocurrency Regulation: Stakeholders, Roots of Bitcoin, Legal Aspects - Cryptocurrency Exchange, Black Market and Global Economy- Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain					
UNIT-V: NEXT GENERATION INDUSTRY					9
Industry 4.0: The Fourth Revolution- - Sustainability Assessment of Manufacturing Industry - Lean Production System - Smart and Connected Business Perspective - Smart Factories – Industry 5.0					

	LECTURE	TUTORIAL	TOTAL
	45	**-**	**45**

TEXT

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

2. Blockchain for Beginners: The Complete Step by Step Guide to Understanding Blockchain Technology by Mark Watney

Reference

1. Cryptocurrencies and Blockchains by Quinn DuPont

2. Blockchain Applications: A Hands-On Approach Paperback by Arshdeep Bahga

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

YCACE3C DIGITAL IMAGE PROCESSING

Course Outcomes:

CO1	C	Understand	*Describe* the basics of digital image fundamentals.
CO2	C	Remember	*Understand* the classifications of Image Processing techniques.
CO3	C	Understand	*Describe* various types of feature extraction techniques applicable for image vision.
CO4	C	Understand	*Explain* Image encoding
CO5	C	Understand	*Describe* encoding images based on the concept of Fourier transforms.
CO6	C	Understand	*Define* the concept of filtering and Restorations.

Course Code	Course Name	L	T	P	C
YCACE3C	**DIGITAL IMAGE PROCESSING**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0		**L**	**T**	**P**	**H**
		3	**0**	**0**	**3**

UNIT –I: Digital Image Fundamentals	**9**
Image digital Representation. Elements of visual perception -Sampling and quantization. Image processing system elements. Fourier transforms. Extension to 2· D, OCR, Walsh, Hadamard transforms.	

UNIT- II: Image Transformation and segmentation	**9**
Enhancement and segmentation: Histogram modification. Smoothing, sharpening.	

UNIT – III: Feature Extraction	**9**
Thresholding - Edge Detection. Segmentation. Point and region dependent techniques.	

UNIT -IV : Image Encoding	**9**
Image encoding: Fidelity criteria. Transform compression. KL, Fourier, DCT. Spatial compression, Run length coding. Huffman and contour coding.	

UNIT- V : Image Restoration	**9**
Restoration: Models. Inverse filtering. Least squares filtering. Recursive filtering.	

	LECTURE	**TUTORIAL**	**TOTAL**
	45	**0**	**45**

TEXT
1. Mark Nixon, et.a l, "Feature Extraction & Image processing for Computer vision" 3 rd Edition, 2012.

REFERENCES

1. Gonslaez, Richard E. Woodset.a1, "Digital Image Processing", Addison Wesley, Reading, M.A., 1990.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCACE3D NATURAL LANGUAGE PROCESSING

Course Outcomes:

CO1	C	Understand	*Define* the Linear Text Classification of NLP
CO2	C	Remember	*Demonstrate* the Nonlinear classification
CO3	C	Understand	*Identify* the various Language Models of NLP
CO4	C	Understand	*Analyze* and Apply the Formal Language Theory
CO5	C	Understand	*Explain* Logical Semantics
CO6	C	Understand	*Explain* and formulate the Predicate argument Semantics

Course Code	Course Name	L	T	P	C
YCACE3C	**NATURAL LANGUAGE PROCESSING**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0		L	T	P	H
		3	**0**	**0**	**3**

UNIT- I : NLP Introduction	**9**
NLP Introduction: Natural Language Processing and Its Neighbours – Three Themes in NLP - Linear Text Classification: The bag of words – Naïve Bayes – Discriminative Learning – Loss Functions and Large-margin Classification – Logistic Regression – Optimization	
UNIT- II : Nonlinear Classification	**9**
Nonlinear Classification: Feedforward Neural Network – Designing Neural Network – Learning Neural Network – Conventional Neural Network - Linguistic Applications of Classification: Sentiment and Opinion Analysis – Word Sense Disambiguation – Design Decisions for Text Classification – Evaluating Classifier – Building Datasets.	
UNIT- III: Language Models	**9**
Nonlinear Classification: Feedforward Neural Network – Designing Neural Network – Learning Neural Network – Conventional Neural Network - Linguistic Applications of Classification: Sentiment and Opinion Analysis – Word Sense Disambiguation – Design Decisions for Text Classification – Evaluating Classifier – Building Datasets.	
UNIT -IV : Formal Language Theory	**9**
Formal Language Theory: Regular Languages – Context Free Languages - Context Free Parsing: Deterministic Bottom up Parsing – Ambiguity – Weighted Context Free Grammars – Learning Weighted Context Free Grammars – Grammar Refinement	
UNIT- V : Logical Semantics	**9**
Logical Semantics: Meaning and Denotation – Logical Representation of Meaning – Semantic Parsing and the Lambda Calculus – Learning Semantic Parsers - PredicateArgument Semantics: Semantic Roles – Semantic Role Labeling – Abstract Meaning Representation	

		LECTURE	**TUTORIAL**		**TOTAL**
		45	**0**		**45**

	TEXT
1.	Jacob Eisenstein, "Introduction to Natural Language Processing", MIT Press, 2019.

	REFERENCES
1.	Lawrence Rabiner, Biing-Hwang Juang, B. Yegnanarayana, "Fundamentals of Speech Recognition" 1st Edition, Pearson, 2009.
2.	Steven Bird, Ewan Klein, and Edward Loper, "Natural language processing with Python", O'REILLY

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCACE4A DEEP LEARNING

Course Outcomes:

CO1	C	Understand	*Describe* the basics of neural networks.
CO2	C	Understand	*Understand* Deep Learning
CO3	C	Understand	*Describe* various types of feature extraction techniques applicable for image vision.
CO4	C	Understand	*Describe* various deep learning architectures.
CO5	C	Understand	*Define* the concept of image segmentation
CO6	C	Understand	*Explain* the case study with deep learning

Course Code	Course Name	L	T	P	C
YCACE4A	**DEEP LEARNING**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0		**L**	**T**	**P**	**H**
		3	**0**	**0**	**3**
UNIT –I: Fundamentals of Neural Networks					**9**
General Concepts of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Network.					
UNIT- II: Introduction to Deep Learning					**9**
Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nesterov's Accelerated Gradient Descent – Regularization – Dropout.					
UNIT – III: Convolutional Neural Networks					**9**
CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning.					
UNIT -IV : Deep Learning Architectures					**9**
LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Autoencoders – Adversarial Generative Networks – Autoencoder and DBM.					
UNIT- V : Applications of Deep Learning					**9**
Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks –					

Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs

	LECTURE	TUTORIAL	TOTAL
	45	**0**	**45**

TEXT

1. Ian Good Fellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2017.

REFERENCES

1. Francois Chollet, "Deep Learning with Python", Manning Publications, 2018.

2.Phil Kim, "Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence", Apress , 2017.

3.Ragav Venkatesan, Baoxin Li, "Convolutional Neural Networks in Visual Computing", CRC Press, 2018.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

YCACE4B EXPLORATORY DATA ANALYSIS

Course Outcomes:

CO1	C	Understand	Illustrate the basic concepts of Exploratory Data Analysis.
CO2	C	Understand	Outline the EDA assumptions.
CO3	C	Understand	Utilize EDA techniques
CO4	C	Understand	Summarize Graphical techniques for EDA
CO5	C	Understand	Classify the probability distribution in EDA
CO6	C	Understand	Explain on EDA case studies

COURSE CODE	COURSE NAME	L	T	P	C
YCACE4B	**EXPLORATORY DATA ANALYSIS**	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
PREREQUISITE	Basic Concepts of Programming, Design	3	0	0	3
UNIT-I : INTRODUCTION					9
Introduction to Exploratory Data Analysis, Difference between classic data analysis and exploratory data analysis, difference between summary analysis and data exploratory analysis.					
UNIT- II: EDA					9
Basic EDA assumptions, importance of underlying assumptions, techniques for testing assumptions, interpretation of 4-Plot, consequences of non-randomness, non-fixed parameters like location and variation parameters, consequences related to distributional assumptions.					
UNIT- III: EDA TECHNIQUES					9
EDA techniques, analysis questions, graphical techniques, auto correlation plot for random data, moderate correlation, strong and autoregressive correlation, sinusoidal correlation, Various Plot.					
UNIT- IV: ANOVA					9
Graphical techniques for EDA, Quantitative techniques, ANOVA, Bartlett's test, probability distributions, family of probability distribution, location and scale parameters, estimation of parameters, various distributions.					
UNIT- V: CASE STUDIES					9
EDA case studies – Random distribution, Random walk, standard resistor, Heat flow meter.					
		LECTURE	**TUTORIAL**		**TOTAL**
		45	**0**		**45**
TEXT BOOKS:					
1. Exploratory Data Analysis by John W. Tukey (1977) – 2016 Reprint. 2. Exploratory Data Analysis with R by Roger Peng (2016).					
REFERENCES					
1. Think Stats: Exploratory Data Analysis (2nd edition) by Allen B. Downey (2014)					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1– Low relation

YCACE4C BUSINESS INTELLIGENCE

Course Outcomes:

CO1	C	Understand	*Define* Structure of Business Intelligence system
CO2	C	Understand	*Describe* OLAP Concept
CO3	C	Understand	*Explain* Data view
CO4	C	Understand	*Summarize* Advanced Dimensional Design
CO5	C	Understand	*Explain* Creating Data from Analysis Services
CO6	C	Understand	*Explain* Retrieving Data from Analysis Services

Course Code	Course Name	L	T	P	C
YCACE4C	**BUSINESS INTELLIGENCE**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0		L	T	P	H
		3	**0**	**0**	**3**

UNIT –I: Introduction	**9**
Meaning- Purpose and Structure of Business Intelligence Systems. Understanding Multidimensional Analysis Concepts: Attributes- Hierarchies and Dimensions in data Analysis. Understanding Dimensional Data Warehouse: Fact Table, Dimension Tables - Surrogate Keys and alternative Table Structure.	

Unit II :Understanding OLAP	**9**
Basic Concepts of OLAP-Advantages -Fast response- Meta-data-based queries- Working with Spread sheet- Understanding Analysis Services speed and meta-data. Analysis Services Tools. Data Extraction, Transformation and Load. Meaning and Tools for the same.	

UNIT – III: Creating Business Intelligence Project	**9**
Creating Data source, Creating Data view. Modifying the Data view. Creating Dimensions, Time, and Modifying dimensions. Parent-Child Dimension. **Creating Cube:** Wizard to Create Cube - Preview of Cub e- Adding measure and measure groups to a cube-Calculated members- Deploying and Browsing a Cube.	

UNIT -IV : Advanced Measures and Calculations	**9**
Aggregate Functions. Using MDX to retrieve values from cube - Calculation Scripting. Creation of KPI's - **Advanced Dimensional Design:** Creating reference- fact and many to many dimensions-	

Unit V : - Data Mining	**9**
Using Financial Analysis Cubes -Interacting with a cube -Creating Standard and Drill Down Actions- **Retrieving Data from Analysis Services:** Creating Perspectives- MDX Queries, Excel with Analysis Services	

	LECTURE	TUTORIAL	TOTAL
	45	**0**	**45**

TEXT
1. Carlo Vercellis (2011). "Business Intelligence: Data Mining and Optimization for Decision Making". John Wiley & Sons
REFERENCES
1. Carlo Vercellis (2011). "Business Intelligence: Data Mining and Optimization for Decision Making". John Wiley & Sons.   2.David Loshin (2012). "Business Intelligence: The Savvy Manager's Guide". Newnes. Elizabeth Vitt, Michael Luckevich,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

<h1 style="text-align:center">YCACE4D   PREDICTIVE ANALYTICS</h1>

Course Outcomes:

CO1	C	Understand	*Describe* the basics of data mining .
CO2	C	Understand	*Illustrate* the concepts of data visualization
CO3	C	Understand	*Describe* model development and its techniques
CO4	C	Understand	*Describes* various algorithms in analytics
CO5	C	Understand	*Infer* various model deployment.
CO6	C	Understand	*Describes* various analytic types.

Course Code	Course Name	L	T	P	C
YCACE4D	**PREDICTIVE ANALYTICS**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0		L	T	P	H
		3	**0**	**0**	**3**

UNIT –I: Introduction	**9**
Introduction to Data Mining Introduction, what is Data Mining? Concepts of Data mining, Technologies Used, Data Mining Process, KDD Process Model, CRISP – DM, Mining on various kinds of data, Applications of Data Mining, Challenges of Data Mining.	

Unit II : Data Understanding and Preparation	**9**
Introduction, Reading data from various sources, Data visualization, Distributions and summary statistics, Relationships among variables, Extent of Missing Data. Segmentation, Outlier detection, Automated Data Preparation, Combining data files, Aggregate Data, Duplicate Removal, Sampling DATA, Data Caching, Partitioning data, Missing Values.	

UNIT – III: Model development & techniques	**9**
Data Partitioning, Model selection, Model Development Techniques, Neural networks, Decision trees, Logistic regression, Discriminant analysis, Support vector machine, Bayesian Networks, Linear Regression, Cox Regression, Association rules.	

UNIT -IV : Model Evaluation and Deployment	**9**
Introduction, Model Validation, Rule Induction Using CHAID, Automating Models for Categorical and Continuous targets, Comparing and Combining Models, Evaluation Charts for Model Comparison, MetaLevel Modeling, Deploying Model, Assessing Model Performance, Updating a Model.	

Unit V : Analytics	**9**
Software Analytics – Embedded Analytics – Learning Analytics – Predictive Analytics – Prescriptive Analytics – Social Media Analytics – Behavioral Analytics. Analyse and predict results based on historical patterns.	

	LECTURE	TUTORIAL	TOTAL
	45	**0**	**45**

TEXT
1. Predictive & Advanced Analytics (IBM ICE Publication)

	2. Jiaweu Gab, Micgekube Janver, Jian Pei, **"Data Mining Concepts"**,Third Edition, Morgan Kaufmann Publications, 2012.

REFERENCES

1. Drew Bentley, **"Business Intelligence and Analytics"**, Library Press, 2017.
2. Arun K Pujari **"Data Mining Techniques"**, 3rd Edition, University Press, 2013.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	2	2	2	2	2	1	3	2
CO 2	3	2	2	2	1	2	1	1	3	1
CO 3	3	2	2	2	2	1	2	1	3	1
CO 4	3	2	2	2	1	2	1	1	3	2
CO 5	3	2	2	2	1	2	2	1	3	1
CO6	3	2	2	2	2	2	2	1	3	1
Total	18	12	12	12	9	11	10	6	18	8
Course	3	2	2	2	1	2	2	1	3	1

0-No relation   3- Highly relation   2- Medium relation   1- Low relation

Value Added Courses offered for MCA Programme from 2023-2024
(Semester-I, II, III)

a. Advanced Java Programming

b. Python Programming

c. R Programming

d. IoT

e. Natural Language Processing

f. Data Science

g. Robotics Technology

h. DevOps

i. AWS

j. Google Cloud

k. Go Programming

COURSECODE	VA-YCA-01
COURSE NAME	ADVANCED JAVA PROGRAMMING
PREREQUISITE	Basic Concept of Java Programming
Total Hours	Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40

COURSE OBJECTIVES
1. The student will gain knowledge in basics of java programming
2. The student will under stand about the applet, servlet, RMI
3. The student will be able to do JDBC,CORBA, swing
4. The students will be able to work with networking and J2EE

Unit	Content	LTPSS
1.	Environment Setup	L-2 P-2
2.	Fundamentals of JAVA	L-2 P-2
3.	Applets	L-2 P-2
4.	Servlet	L-2 P-2
5.	RMI	L-2 P-2
6.	JDBC	L-2 P-2
7.	CORBA	L-2 P-2
8.	Swing	L-2 P-2
9.	Networking	L-2 P-2
10.	J2EE	L-2 P-2

HOURS		LECTURE	PRACTICAL	TOTAL
		20	20	40

TEXT
1. Patrick Naughton , Herbert Schildt, JAVA2- The Complete Reference, Tata McGraw   Hill,Fifth Edition, New Delhi, 2002.   2. Jeffrey C.Jackson, "Web Technologies A Computer Science Perspective" Pearson   Education, 2007.   3. Stephen Asbury, Scott R. Weiner, Wiley, Developing Java Enterprise Applications, 1998   4. D.Norton and H.Schildt, Java2: The Complete Reference, TMH 2000.   5. E.Balagurusamy, Programming with Java, A primer second edition, Tata McGraw   Hill, New Delhi.
REFERENCES
1. Deitel H M and Deitel P J, "JAVA-How to Program", Prentice Hall of India Private Limited, New Delhi, 2008.   2. D.Jana, Java and Object oriented Programming Paradigm, PHI, New Delhi, 2005.   3. Cay S.Horstman,Gary Cornell, "Core Java ", Volume I, II, Eigth Edition, Pearson   Education, 2008.   4. Tom Valesky, "Enterprise Java Beans", Pearson Education, 2002.   5. Jeremy Rosenberger,"Teach Yourself CORBA in 14 days", Tech media, 2000.
E REFERENCES
http://www.nptelvideos.com/java/java_video_lectures_tutorials.php   http://www.nptelvideos.com/java/java_video_lectures_tutorials.php   http://freevideolectures.com/Course/2513/Java-Programming.

COURSECODE	VA-YCA-02
COURSE NAME	Python Programming
PREREQUISITE	Basics of Programming
Total Hours	Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40

COURSE OBJECTIVES
5. The student will gain knowledge in basics of python programming
6. The student will under stand about the control structure and Modules
7. The student will be able to do File handling Process.
8. The students will be able to operate the Database, Networking process.

Unit	Content	LTPSS
1.	Environment Setup	L-2 P-2
2.	Fundamentals of Python	L-2 P-2
3.	Control Structures	L-2 P-2
4.	Dictionary, Modules	L-2 P-2
5.	File I/O, Exceptions	L-2 P-2
6.	Classes/Objects	L-2 P-2
7.	Multithreading	L-2 P-2
8.	Database Access	L-2 P-2
9.	Networking	L-2 P-2
10.	XMP Processing	L-2 P-2

HOURS	LECTURE	PRACTICAL	TOTAL
	20	20	40

TEXT

1. Jason Cannon, Python Programming for Beginners, Kindle Edition, 2015.
2.Ramsey Hamilton, Python Programming: A Beginner's Guide to Learn Python in 7 Days, Kindle Edition, 2016

REFERENCES

1.John Paul Mueller & Luca Massaron, Python for Data Sciences for Dummies, Kindle Edition, 2015
2.Dr.Gabriele Lanaro & Quan Nguyen, Leaning Path Advanced Python Programming, Kindle Edition, 2019

E REFERENCES

1. https://onlinecourses.nptel.ac.in/noc18_cs35
2.https://nptel.ac.in/courses/106105166/26
3.https://nptel.ac.in/courses/117106113/34

COURSECODE	VA-YCA-03
COURSE NAME	R Programming
PREREQUISITE	Basics of Programming
Total Hours	Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40

COURSE OBJECTIVES

1. The student will gain knowledge in basics of R-Programming
2. The student will understand about the Factors and Data Frames
3. The student will be able to do charts and Graphs using R.
4. The students will be able to operate the various statistics application with R

Unit	Content	LTPSS
1.	Basic Fundamentals	L-2 P-2
2.	Control Structures	L-2 P-2
3.	Vectors, Lists	L-2 P-2
4.	Arrays	L-2 P-2
5.	Factors	L-2 P-2
6.	Data Frames	L-2 P-2
7.	Packages	L-2 P-2
8.	R Data Interfaces	L-2 P-2
9.	R Charts and Graphs	L-2 P-2
10.	R Statistics	L-2 P-2

HOURS	LECTURE	PRACTICAL	TOTAL
	20	20	40

TEXT

1.Sandip Rakshit, R Programming for Beginners, Tata Mc Graw Hill Publications, 2017.

REFERENCES

1.Seema Acharya, Data Analytics using R, Tata Mc Graw Hill Publications, 2018.
2.Michael J.Grawley, The R Book, Wiley Publications, 2017.

E REFERENCES

1. https://nptel.ac.in/courses/111104100/
2. https://nptel.ac.in/noc/individual_course.php?id=noc18-cs52
3. https://nptel.ac.in/courses/102101056/9

COURSECODE	VA-YCA-04
COURSE NAME	IoT
PREREQUISITE	Basics of Programming
Total Hours	Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40

COURSE OBJECTIVES

1. The student will gain knowledge in basics of IoT
2. The student will understand about the Technology & Protocols
3. The student will be able to do IoT applications.
4. The students will be able to work with various editors.

Unit	Content	LTPSS
1.	IoT Overview	L-2 P-2
2.	Hardware	L-2 P-2
3.	Software	L-2 P-2
4.	Technology & Protocols	L-2 P-2
5.	Common Uses	L-2 P-2
6.	Media, Marketing & Advertising	L-2 P-2
7.	IoT-Environment Monitoring	L-2 P-2
8.	IoT-Energy Applications	L-2 P-2
9.	IoT-Virtualization	L-2 P-2
10.	IoT-Eclipse & Security	L-2 P-2

HOURS	LECTURE	PRACTICAL	TOTAL
	20	20	40

TEXT

1.Olivier Hersent, David Boswarthick, The Internet of Things: Key applications and protocols, Wiley Publications, 2015

REFERENCES

1.Kai Hwang, Min Chen, Big Data Analytics for Cloud,IoT and Cognitive Computing, Wiley Publications, 2017.
2.Adrian Mcewen, Hakin Cassimally, Designing the Internet of Things, Wiley Publications, 2015.

E REFERENCES

1. https://nptel.ac.in/courses/108108098/4
2. https://nptel.ac.in/courses/106105166/

COURSECODE	VA-YCA-05
COURSE NAME	**Natural Language Processing**
PREREQUISITE	**Basics of Programming**
Total Hours	**Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40**

COURSE OBJECTIVES
1. The student will gain knowledge in basics of NLP
2. The student will understand about the speech tagging and sequence labeling
3. The student will be able to know the neural networks
4. The students will be able to work with pattern recognition and translation

Unit	Content	LTPSS
1.	Introduction	L-2 P-2
2.	N-gram Language Models	L-2 P-2
3.	Part Of Speech Tagging and Sequence Labeling	L-2 P-2
4.	Basic Neural Networks	L-2 P-2
5.	LSTM Recurrent Neural Networks	L-2 P-2
6.	Syntactic parsing	L-2 P-2
7.	Semantic Analysis	L-2 P-2
8.	Information Extraction (IE)	L-2 P-2
9.	Machine Translation (MT)	L-2 P-2
10.	Pattern Recognition	L-2 P-2

HOURS	LECTURE	PRACTICAL	TOTAL
	20	20	40

TEXT

1.An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition, by Daniel Jurafsky and James H. Martin.

REFERENCES

1. urafsky, David, and James H. Martin. *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition*. Upper Saddle River, NJ: Prentice-Hall, 2000. ISBN: 0130950696

E REFERENCES

1. https://nptel.ac.in/courses/106/105/106105158/

COURSECODE	VA-YCA-06
COURSE NAME	Data Science
PREREQUISITE	Basics of Programming
Total Hours	Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40

COURSE OBJECTIVES

1. The student will gain knowledge in basics of R
2. The student will understand about the Linear Algebra and Statistical Modeling
3. The student will be able know the Regression
4. The students will be able to work with Data set Analysis

Unit	Content	LTPSS
1.	Introduction to R	L-2 P-2
2.	Linear Algebra	L-2 P-2
3.	Statistical Modeling	L-2 P-2
4.	Optimization	L-2 P-2
5.	Introduction to data science	L-2 P-2
6.	Predictive Modeling	L-2 P-2
7.	Regression	L-2 P-2
8.	Multiple Linear Regression	L-2 P-2
9.	K-Means clustering	L-2 P-2
10.	Data Set Analysis	L-2 P-2

HOURS	LECTURE	PRACTICAL	TOTAL
	20	20	40

TEXT

1. Hadley Wickham, Garrett Grolemund, "R for Data Science", O'Reilly Publications,

REFERENCES

1.Andrew Bruce, Peter C. Bruce, and Peter Gedeck, "Practical Statistics for Data Scientists**",** O'Reilly Publications**.**

E REFERENCES

1.https://nptel.ac.in/courses/106/106/106106179/

COURSECODE	VA-YCA-07
COURSE NAME	**Robotics Technology**
PREREQUISITE	**Basics of Programming**
Total Hours	**Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40**

COURSE OBJECTIVES
1. The student will gain knowledge in basics of Machine and Deep Learning
2. The student will understand about Python and R
3. The student will be able to know the Robotics and its Motion
4. The students will be able to work with various applications

Unit	Content	LTPSS
1.	Introduction	L-2 P-2
2.	Machine Learning	L-2 P-2
3.	Deep Learning	L-2 P-2
4.	Fundamentals of Python	L-2 P-2
5.	Fundamentals of R	L-2 P-2
6.	Aerial Robotics	L-2 P-2
7.	Computational Motion Planning	L-2 P-2
8.	Mobility	L-2 P-2
9.	Perception	L-2 P-2
10.	Applications	L-2 P-2

HOURS	LECTURE	PRACTICAL	TOTAL
	20	20	40

TEXT

1.Kathy Ceceri, "Making Simple Robots: Exploring Cutting-Edge Robotics with Everyday Stuff" **,** ISBN-13: 978-1457183638, ISBN-10: 9781457183638

REFERENCES

1. Robin R. Murphy," Introduction to AI Robotics",MIT Press.

COURSECODE	VA-YCA-08
COURSE NAME	DevOps
PREREQUISITE	Basics of Programming
Total Hours	Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40

COURSE OBJECTIVES
1. The student will Learn AWS Cloud infrastructure tool
2. The student will understand about Chef DevOps tool
3. The student will Learn Docker and Deploy application anywhere anytime without VM or Cloud The students will be able to work with various editors.

Unit	Content	LTPSS
1.	AWS Cloud Formation Documentation	L-2 P-2
2.	Understanding Devops Mindsets	L-2 P-2
3.	Devops Principles	L-2 P-2
4.	CI and CD Principles	L-2 P-2
5.	Version Control and Version control Tools	L-2 P-2
6.	Working With AWS Power Shell	L-2 P-2
7.	Understanding Application Life Cycle Management	L-2 P-2
8.	Implementing Test Case Using Jenkin Pipeline	L-2 P-2
9.	AWS Cloud Formation	L-2 P-2
10.	Single Instance with TempLates	L-2 P-2

HOURS	LECTURE	PRACTICAL	TOTAL
	20	20	40

TEXT

1. Learn Azure DevOps CI/CD pipelines Create CI/CD pipelines for Java, .NET, NodeJs, Docker, Terraform, Nuget, Xamarin, SQL Server and ARM templates

REFERENCES

1. DevOps - The Complete Guide,Docker, Git and Github

E REFERENCES

1. https://nptel.ac.in/courses/128106012
2. https://elearn.nptel.ac.in/shop/iit-workshops/completed/cicd-devops-automation-and-devsecops-automation/

COURSECODE	VA-YCA-09
COURSE NAME	AWS
PREREQUISITE	Basics of Programming
Total Hours	Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40

COURSE OBJECTIVES
1. The student will Learn overview Commands
2. The student will understand about Grep
3. The student will Learn Filter Commands

Unit	Content	LTPSS
1.	Linux Fundamentals	L-2 P-2
2.	AWS Overview	L-2 P-2
3.	EC2 Instance	L-2 P-2
4.	Auto Scaling	L-2 P-2
5.	Load Balancing	L-2 P-2
6.	EBS	L-2 P-2
7.	Object Storage in Cloud	L-2 P-2
8.	Cloud Front	L-2 P-2
9.	Amazon Virtual Private Cloud	L-2 P-2
10.	AWS Troubleshooting	L-2 P-2

HOURS	LECTURE	PRACTICAL	TOTAL
	20	20	40

TEXT

1. Saurabh Shrivastava, Neelanjali Srivastav, Alberto Artasanchez, "AWS for Solutions Architects Build and migrate your workload to Amazon Web Services using the cloud-native approach", 2nd Edition (Kindle Edition)

REFERENCES

1. JAMES HORN , "AMAZON WEB SERVICES FOR NEWBIES A Beginner's Guide to Cloud Computing with AWS (Kindle Edition)", Jan 13, 2023

E REFERENCES

1. https://elearn.nptel.ac.in/shop/iit-workshops/completed/amazon-web-services-aws/

COURSECODE	VA-YCA-10
COURSE NAME	Google Cloud
PREREQUISITE	Basics of Programming
Total Hours	Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40

COURSE OBJECTIVES

1. The student will Learn overview Commands
2. The student will understand about Grep
3. The student will Learn Filter Commands

Unit	Content	LTPSS
1.	A unified approach to the cloud	L-2 P-2
2.	Connect Google Cloud SQL with Apps and Tools	L-2 P-2
3.	Google App Engine	L-2 P-2
4.	New Project with Cloud Resource Manager API Client for .NET	L-2 P-2
5.	New Project with Cloud Resource Manager API Client for Python	L-2 P-2
6.	Technical deep-dive	L-2 P-2
7.	The cloud maturity phases	L-2 P-2
8.	The cloud maturity scale	L-2 P-2
9.	The epics	L-2 P-2
10.	Technical deep-dive	L-2 P-2

HOURS		LECTURE	PRACTICAL	TOTAL
		20	20	40

TEXT

1. Sparx Systems , " GoogleCloudPlatform(GCP)",2022

REFERENCES

1. Valliappa Lakshmanan , "Data Science on the Google Cloud Platform", "O'Reilly Media, Inc.", 2022

E REFERENCES

1. https://nptel.ac.in/courses/106105223

COURSECODE	VA-YCA-11
COURSE NAME	Go Programming
PREREQUISITE	Basics of Programming
Total Hours	Lecture (L) – 20, Tutorial (T) – 0, Practical (P) – 20, Self Study (SS) – 0 . Total = 40

COURSE OBJECTIVES
1. The student will understand Go programming language
2. The student will Learn about Identifiers and variables
3. The student will Learn Maps

Unit	Content	LTPSS
1.	Go programming language	L-2 P-2
2.	Identifiers in Go Language	L-2 P-2
3.	Control Statements	L-2 P-2
4.	String Variables	L-2 P-2
5.	Integer Variables	L-2 P-2
6.	Arrays	L-2 P-2
7.	Slices	L-2 P-2
8.	Maps	L-2 P-2
9.	Variadic Functions	L-2 P-2
10.	Channels	L-2 P-2

HOURS	LECTURE	PRACTICAL	TOTAL
	20	20	40

TEXT

1. Jeremy Cook, " Go Programming", 2022

REFERENCES

1. CALEB DOXSEY, "An Introduction to Programming in Go",2012

E REFERENCES

1. https://github.com/cloudacademy/learn-go
2.https://github.com/cloudacademy/godemo

Articulation Matrix

Course Code	C	P	A	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	L	T	P	C
YCA101	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCA102	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCA103	4	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCA104	5	0	0	14	12	12	10	12	12	12	12	12	12	3	0	0	3
YCA105	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCA106	2	0	0	18	12	12	12	9	11	10	6	18	8	0	0	2	2
YCA107	2	0	0	18	12	12	12	9	11	10	6	18	8	0	0	4	2
YCA108	2	0	0	18	12	12	12	9	11	10	6	18	8	0	0	4	2
YCA201	4	0	0	18	12	12	12	9	11	10	6	18	8	3	1	0	4
YCA203	4	0	0	18	12	12	12	9	11	10	6	18	8	3	1	0	4
YCA204	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCA206	2	0	0	18	12	12	12	9	11	10	6	18	8	0	0	4	2
YCA207	2	0	0	18	12	12	12	9	11	10	6	18	8	0	0	4	2
YCA208	2	0	0	18	12	12	12	9	11	10	6	18	8	0	0	2	2
YCA301	3	0	0	17	15	12	12	12	6	12	12	15	15	3	0	0	3
YCA302	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCA305	3	0	0	18	12	12	12	9	11	10	6	18	8	0	0	3	3
YCA306	2	0	0	18	12	12	12	9	11	10	6	18	8	0	0	2	2
YCA307	2	0	0	18	12	12	12	9	11	10	6	18	8	0	0	4	4
YCA308	2	0	0	18	12	12	12	9	11	10	6	18	8	0	0	4	4
YCA401	3	0	0	10	10	10	10	10	10	10	10	15	15	3	0	0	3
YCA402	11	0	0	18	12	12	12	9	11	10	6	18	8	0	0	24	11
YCAME2 A	3	0	0	17	13	3	8	6	6	6	6	0	0	3	0	0	3
YCAME2 B	3	0	0	12	6	0	0	6	6	6	6	0	0	3	0	0	3
YCAME2 C	3	0	0	18	14	3	9	6	6	6	6	0	0	3	0	0	3
YCAME2 D	3	0	0	17	12	1	6	6	6	6	6	0	0	3	0	0	3
YCABE5 A	3	0	0	12	10	6	6	12	6	6	6	12	12	3	0	0	3
YCABE5 B	3	0	0	12	9	6	6	12	6	6	6	12	12	3	0	0	3
YCABE5 C	3	0	0	12	9	6	6	12	6	6	6	12	12	3	0	0	3
YCABE5 D	3	0	0	12	9	6	6	12	6	6	6	12	12	3	0	0	3

MCA Curriculum and Syllabus

YCACE3 A	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCACE3 B	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCACE3 C	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCACE3 D	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCACE4 A	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCACE4 B	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCACE4 C	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3
YCACE4 D	3	0	0	18	12	12	12	9	11	10	6	18	8	3	0	0	3