PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY

PERIYAR MANIAMMAI
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University)
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Criterion 1 – Curricular Aspects

Key Indicator	1.1	Curriculum Design and Development
Metric	1.1.2	Percentage of Programmes where syllabus revision was carried out during 2023-24

Department of Computer Science and Applications

S. No	Programme Code	Programme Name	Year of Introduction	Year of revision (if any)	Percentage of Syllabus content added or replaced
1	453	Master of Computer Applications	1994	2023	92.85%

S.No.	Contents
1	Minutes of Board of Studies
2	Extracts of minutes of the Academic Council Meeting
3	Curriculum and Syllabus of the programme – Before Revision
4	Curriculum and Syllabus of the programme – After Revision

Legend :

Highlighted Color - Red – Indicates courses which are removed from syllabus before revision

Highlighted Color - Green – Indicates courses which are removed from syllabus after revision

1. Minutes of Board of Studies for MCA held on 15.06.2023

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PERIYAR MANIAMMA INSTITUTE OF SCIENCE & TECHNOLOGY

Faculty of Computing Sciences and Engineering

Department of Computer Science and Applications

BOARD OF STUDIES MEETING

Minutes of Meeting

Date: 15.06.2023 **Time: 2:30 PM** **Venue: CSA Dept.**

Meeting Link: https://meet.google.com/bqu-pngt-qfp

Agenda:

- M.Sc. Data Science Regulation 2023 syllabi and curriculum
- MCA Regulation 2023 syllabi and curriculum
- B.Sc. Data Science Regulation 2022 – R1
- BCA Regulation 2021- R2
- Discussion on PEO, PO, and PSO of M.Sc. Data Science
- Discussion on Value-Added Courses
- Discussion on Course Outcomes

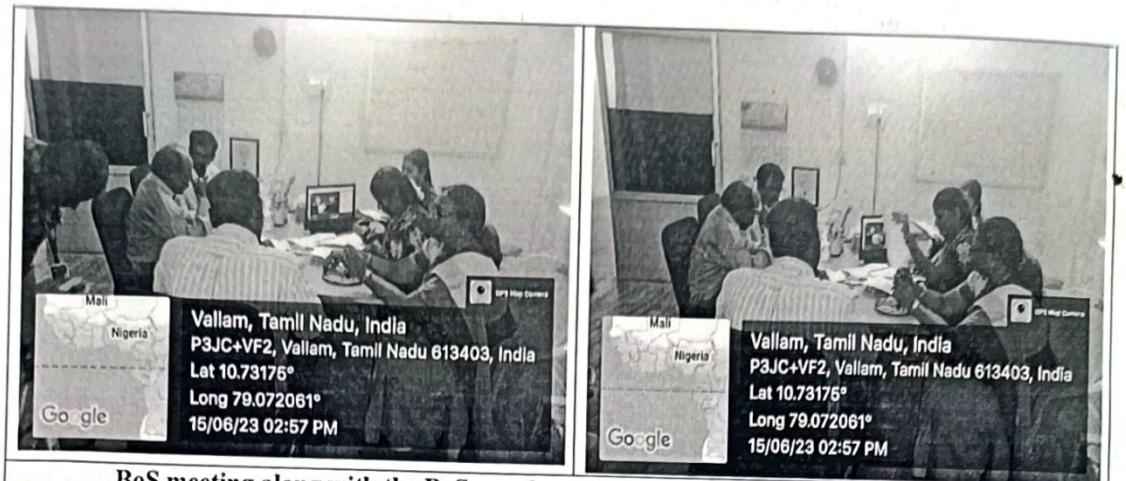
Members present:

The BoS members and the snaps of meeting are listed in Table, table I and Fig.1 and 2.

Table I Members of the BoS

S.No	Name of the Member	Designation and Address	Signature
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. nickolas@nitt.edu, nickolasnitt@gmail.com. 94435 61989,94860 01131	
4.	Mr.J.Sengathir **(Industry Expert)**	Manager Enterprise Resource Planning.BHEL Trichy – 620 014 Sengathir@bhel.in 9489051236	
5.	Dr.V.Adithya Pothan Raj **(Industry Expert)** **Online Mode**	Associate Operations Manager .CTS. Chennai.apr1991@rediffmail.com 9444408814	https: meet.google.com/bqu-pngt-qfp
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	https://meet.google.com/bqu-pngt-qfp



BoS meeting along with the BoS members Dr.S.Nickolas (Academic Expert) and Mr.J.Sengathir (Industry Expert)

A. FEEDBACK ON CURICULLAR ASPECTS

The feedbacks were collected and analyzed during 2019-20 ,2020-21 and 2021-2022 from the following stake holders

1. Teachers
2. Employers
3. Alumni students
4. Students

In addition, the feedback from Academic Expert, Industry Expert, Teachers, Alumni and students who participated in Department Advisory Committee Meeting (DAC) were presented. The action taken for the feedbacks are given as "Remarks".

B. CURICULLUM INTERVENTION BASED ON CO ATTAINMENT

The CO attainment and PO attainment for the courses were presented to the members. The below and above target values of Cos attainment were discussed. Syllabus were modified for those courses and documented in the Table II.

C. PRESENTATION OF CURICULLUM AND SYLLABUS

All the courses which are framed by the department of Computer Science and Applications are presented individually. The details of deletion, addition and introduction of new courses are tabulated for all courses in the following table, Table II.

Table II: Discussions on courses with actions as remarks

S.No	Semester	Course Code	Course Name	Course content Deletion/ Addition/ New	Remarks	Action Taken
1	I	YCA101	Database Management Systems	----	----	---
2	I	YCA102	Computer Networks	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
3	I	YCA103	Object Oriented Programming, Analysis and Design	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
4	I	YCA104	Management Support Systems	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
5	I	YCA105	Mathematical Foundation for Computer Applications	----	----	---
6	I	YCA106	Database Management Systems Lab	----	----	---
7	I	YCA107	Mathematical Foundation for Computer Applications Lab using Java	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
8	2	YCA201	Advanced Operating System Concepts	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
9	2	YCA202	Software Engineering	----	----	---
10	2	YCA203	Advanced Data Structures	----	----	---
11	2	YCA205	Advanced Operating System Concepts Lab	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
12	2	YCA206	Case Tools Lab	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers

13	3	YCA301	Artificial Intelligence and Machine Learning	----	----	---
14	3	YCA302	Graphics and Multimedia	----	----	---
15	3	YCA303	Optimization Techniques	Removed	Course is removed and added as One of the Electives.	---
16	3	YCA304	Artificial Intelligence and Machine Learning Lab using Python	---	---	---
17	3	YCA305	Optimization Techniques Lab	Removed	-----	---
18	3	YCA306	Industrial Lectures	---	---	---
19	3	YCA307	Mini Project	---	---	---
20	4	YCA401	Research Methodology(Paper Publications)	---	---	---
21	4	YCA402	Project	---	---	---
22	3	YCABM1	Managerial Economics	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
23	3	YCABM2	Corporate Planning	---	---	---
24	2	YCABM3	Foundations of Decision Processes	---	---	---
25	2	YCABM4	Investment Technology	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
26	3	YCABM5	Business Finance	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
27	3	YCABM6	Taxation Practices	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
28	3	YCABM7	MIS Frameworks and Implementation	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
29	2	YCABM8	Management of Software Projects	---	---	---
30	2	YCABM9	Blockchain Technology	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers

31	1	YCAEE1	Data Mining and Data Warehousing	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
32	3	YCAEE10	Bigdata Analytics	----	Course is removed as elective and changed as Core Subject	Feedback given by students and Teachers
33	1	YCAEE2	High Performance Computing	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
34	3	YCAEE3	Compiler Design	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
35	3	YCAEE4	Cloud Computing	----	----	----
36	3	YCAEE5	Distributed Database Management	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
37	3	YCAEE6	Image Processing	----	----	----
38	3	YCAEE7	Parallel Programming	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
39	1	YCAEE8	System Analysis and Simulation	Removed	Course is removed based on BoS members recommendation	Feedback given by students and Teachers
40	1	YCAEE9	Cryptography and Information Security	----	Course is removed as elective and changed as Core Subject	Feedback given by students and Teachers

D. LIST OF NEWLY INTRODUCED COURSES IN REGULATION 2023

S.No	Course Code	Course Title	Semester
1	YCA103	Python Programming	I
2	YCA107	Python Programming Laboratory	I
3	YCA108	Soft Skill Development	I
4	YCA204	Object Oriented Programming Language	II
5	YCA206	Big Data Analytics Laboratory	II
6	YCA207	Object Oriented Programming Language Laboratory	II

7	YCA208	Data Visualisation Lab	II
8	YCA308	Computer Graphics and Multimedia Laboratory	III
9	YCAME2B	Automata Theory	II
10	YCAME2C	Numerical Methods	II
11	YCAME2D	Combinatorics	II
12	YCABE5D	Enterprise Resource Planning	II
13	YCACE3B	Human-Computer Interface	III
14	YCACE3D	Natural Language Processing	III
15	YCAEE4A	Deep Learning	IV
16	YCAEE4B	Exploratory Learning	IV
17	YCAEE4C	Business Intelligence	IV
18	YCAEE4D	Predictive Analysis	IV

E. LIST OF COURSES REMOVED

Table III Table of courses removed in MCA Curriculum 2020

S.No	Course Code	Course Title
1	YCA102	Computer Networks
2	YCA103	Object Oriented Programming, Analysis and Design
3	YCA104	Management Support Systems
4	YCA107	Mathematical Foundation for Computer Applications Lab using Java
5	YCA201	Advanced Operating System Concepts
6	YCA205	Advanced Operating System Concepts Lab
7	YCA206	Case Tools Lab
8	YCA305	Optimization Techniques Lab
9	YCAEE1	Data Mining and Data Warehousing
10	YCAEE2	High Performance Computing
11	YCAEE3	Compiler Design
12	YCAEE8	System Analysis and Simulation
13	YCAEE5	Distributed Database Management
14	YCAEE7	Parallel Programming
15	YCABM4	Investment Technology
16	YCABM9	Blockchain Technology
17	YCABM1	Managerial Economics
18	YCABM5	Business Finance
19	YCABM6	Taxation Practices
20	YCABM7	MIS Frameworks and Implementation

F. PERCENTAGE CHANGE IN THE SYLLABUS

Number of new courses added = 18
Number of courses removed = 20
% change = (20/40 + 18/42) x 100 = 92.85%

G. COURSES ON EMPLOYABILITY/ENTREPRENEURSHIP/SKILL DEVELOPMENT

The curriculum focuses of including 71% of courses with employability, 13% with entrepreneurship and 16% with skill development. The courses are given below

Table V Categorization of courses

Course Code	Course Title	Category
YCA101	Database Management Systems	Employability
YCA102	Cryptography and Network Security	Employability
YCA103	Python Programming	Employability
YCA104	Mathematical Foundation for Computer Applications	Skill Development
YCA105	Software Engineering	Employability
YCA106	Database Management Systems Laboratory	Employability
YCA107	Python Programming Laboratory	Employability
YCA108	Soft Skill Development	Employability
YCA201	Big Data Analytics	Employability
YCA203	Advanced Data Structures	Employability
YCA204	Object Oriented Programming Language	Employability
YCA206	Advanced Data Structures Laboratory	Employability
YCA207	Object Oriented Programming Language Laboratory	Employability
YCA208	Data Visualisation Laboratory	Employability
YCA301	Artificial Intelligence and Machine Learning	Employability
YCA302	Computer Graphics and Multimedia	Employability
YCA305	Mini Projects	Employability
YCA306	Industrial Lecturers	Entrepreneurship
YCA307	Artificial Intelligence and Machine Learning Laboratory using Python	Employability

YCA308	Computer Graphics and Multimedia Laboratory	Employability
YCA401	Review of Literature	Skill Development
YCA402	Main Project	Employability
YCAME2A	Optimization Techniques	Skill Development
YCAME2B	Automata Theory	Skill Development
YCAME2C	Numerical Methods Using Python	Skill Development
YCAME2D	Combinatorics	Skill Development
YCAME2A	Foundations of Decision Processes	Entrepreneurship
YCAME2B	Corporate Planning	Entrepreneurship
YCAME2C	Management of Software Projects	Entrepreneurship
YCAME2D	Enterprise Resource Planning	Entrepreneurship
YCACE3A	Cloud Computing	Employability
YCACE3B	Human-Computer Interface	Employability
YCACE3C	Digital Image Processing	Employability
YCACE3D	Natural Language Processing	Employability
YCACE4A	Deep Learning	Employability
YCACE4B	Exploratory Learning	Employability
YCACE4C	Business Intelligence	Employability
YCACE4D	Predictive Analysis	Employability

H. DISCUSSION ON PROGRAMME ARTICULATION MATRIX (PO COVERAGE BY ALL COS)

The existing POs and PSO was presented. The members agreed that there need not be any changes in the PSO and PO.

I. VALUE ADDED COURSES PROVIDED

Value added courses with more than 30 hours are given to the students by the department. The value-added courses are given in Table VI. The syllabus of the same is given in Appendix A.

Table VI Value-added courses

S.No.	Course Name	Remarks
1.	VA-XCA-01 – Python Programming	Old
2.	VA-XCA-02 – Cloud Computing	Old
3.	VA-XCA-03 – Big Data Analytics	Old
4.	VA-XCA-04 – R Programming	Old
5.	VA-XCA-05 – IoT	Old
6	VA-XCA-06 – DevOps	New
7.	VA-XCA-07 – AWS	New
8.	VA-XCA-08 – Google Cloud	New

9.	VA-XCA-09 – Go Programming	New
10.	VA-XCA-10 – Google Cloud	New

The BoS members recommended to submit the outcome of this meeting in the forthcoming Academic Council meeting for approval.

HoD/CSA
(Dr.D.Ruby)

Dr. D. RUBY M.C.A., M.Phil. ,Ph.D
Associate Professor
Department of Computer Science and Applications
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Vallam, Thanjavur - 613 403.

Dean (FCSE)
(Dr.J.Jeyachidra)

Dr.J.JEYACHIDRA
Dean
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2. Extracts of Minutes of the Academic Council Meeting of MCA conducted on 08.07.2023

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MINUTES OF FORTY SECOND MEETING OF THE ACADEMIC COUNCIL

Date : 08.07.2023 **Venue: Richard Dawkins Hall**

Time : 10.30 A.M **Place : PMIST, Vallam – Thanjavur**

The Forty Second Meeting of the Academic Council of the Periyar Maniammai Institute of Science & Technology (PMIST), Vallam, Thanjavur held on 08.07.2023 at 10.30 a.m.

Prof.S.Velusami, Hon'ble Vice-Chancellor, chaired the meeting.

The following Academic Council Members were present

1.	Dr.D.Aarthi Saravanan	Member
2.	Dr.A.Anand Jerard Sebastine	Member
3.	Dr.S.Arumugam	Member
4.	Dr.A.P.Aruna	Member
5.	Dr.P.Aruna	Member
6.	Dr.S.Asokan	Member
7.	Dr.P.Balakumar	Member
8.	Dr.S.Buvaneswari	Member
9.	Dr.P.Guru	Member
10.	Dr.K.Geetha	Member
11.	Dr.A.George	Member
12.	Dr.A.Manohar (Represented for Dr.S.Gomathi)	Member
13.	Dr.V.Hamsadhwani	Member
14.	Dr.R.Jayanthi	Member
15.	Dr.N.Jayanthi	Member
16.	Dr.J.Jeyachidra	Member
17.	Dr.D.Jeyasimman	Member
18.	Mr.I.Karthic Subramaniayan	Member
19.	Dr.R.Kathiravan	Member

FCSE MCA 42.4.4

TO CONSIDER AND APPROVE increasing intake for MCA programme from 120 to 180 from the academic year 2023-2024.

Notes:

Due to the increased demand in admission the Department of Computer Science and Applications proposed to increase the intake of MCA programme from 120 to 180 from the academic year 2023-2024 onwards.

The matter is placed before the Academic Council for Approval.

Resolution

RESOLVED TO APPROVE increasing intake for MCA programme from 120 to 180 from the academic year 2023-2024.

FCSE MCA, M.Sc.-DS 42.4.5

TO CONSIDER AND APPROVE the Curriculum and Syllabi from I to IV semester of MCA programme under Full Time (Regulation 2023) and M.Sc Data Science programme Under Full Time (Regulation 2023) along with the introduction of Value Added Courses in MCA Programme Under Full Time (Regulation 2023 and) M.Sc Programme Under Full Time (Regulation 2023).

The Value Added Courses are:

- DevOps
- AWS
- Google Cloud
- GO Programming
- Data Visualization

Notes:

The Board of Studies of the Department of Computer Science and Applications recommended the introduction of Value Added Courses and curriculum and syllabi from I to IV Semesters of MCA Programme under full time Regulation 2023 and M.Sc.-Data Science Programme under Full-Time Regulation 2023.

The matter is placed before the Academic Council for Approval.

Resolution

RESOLVED TO APPROVE the Curriculum and Syllabi from I to IV semester of MCA programme under Full-Time (Regulation 2023) and M.Sc Data Science programme Under Full Time (Regulation 2023) along with the introduction of Value Added Courses in MCA Programme Under Full-Time (Regulation 2023 and) M.Sc Programme Under Full-Time (Regulation 2023).

3. Curriculum and Syllabus of the MCA programme – Before Revision

MASTER OF COMPUTER APPLICATIONS (MCA)

REGULATIONS 2020

CURRICULUM

SEMESTER – I

Course Code	Course Title	L	T	P	H	C
YCA101	Database Management Systems	4	1	0	5	4
YCA102	Computer Networks	4	1	0	5	4
YCA103	Object Oriented Programming, Analysis and Design	4	0	0	4	4
YCA104	Management Support Systems	3	0	0	3	3
YCA105	Mathematical Foundation for Computer Applications	4	1	0	5	5
YCA106	Database Management Systems Lab	0	0	4	4	2
YCA107	Mathematical Foundation for Computer Applications Lab using Java	0	0	4	4	2
	Total	**19**	**03**	**08**	**30**	**24**

SEMESTER – II

Course Code	Course Title	L	T	P	H	C
YCA201	Advanced Operating System Concepts	4	1	0	5	4
YCA202	Software Engineering	4	1	0	5	4
YCAIT*	IT Elective I	4	0	0	4	4
YCA203	Advanced Data Structures	4	0	0	4	3
YCABM*	BM Elective I	3	0	0	3	3
YCA205	Advanced Operating System Concepts Lab	0	0	4	4	2
YCA206	Case Tools Lab	0	0	4	4	2
	Total	**19**	**02**	**08**	**29**	**22**

SEMESTER – III

Course Code	Course Title	L	T	P	H	C
YCA301	Artificial Intelligence and Machine Learning	4	0	0	4	4
YCA302	Graphics and Multimedia	3	0	0	3	3
YCAIT*	IT Elective II	3	0	0	3	3
YCABM*	BM Elective II	3	0	0	3	3
YCA303	Optimization Techniques	4	0	0	4	4
YCA304	Artificial Intelligence and Machine Learning Lab using Python	0	0	4	4	2
YCA305	Optimization Techniques Lab	0	0	4	4	2
YCA306	Industrial Lectures	0	0	2	2	2
YCA307	Mini Project	0	0	3	3	2
	Total	**17**	**0**	**13**	**30**	**25**

SEMESTER – IV

Course Code	Course Title	L	T	P	H	C
YCA401	Research Methodology(Paper Publications)	3*(SS)	0	-	3	3
YCA402	Project	0	0	6	6	12
	Total	**3*(SS)**	**0**	**06**	**09**	**15**

INFORMATION TECHNOLOGY ELECTIVES

IT Elective I

Course Code	Course Title	L	T	P	H	C
YCAEE1	Data Mining and Data Warehousing	4	0	0	4	4
YCAEE2	High Performance Computing	4	0	0	4	4
YCAEE3	Compiler Design	4	0	0	4	4
YCAEE8	System Analysis and Simulation	4	0	0	4	4
YCAEE9	Cryptography and Information Security	4	0	0	4	4

IT Elective II

Course Code	Course Title	L	T	P	H	C
YCAEE4	Cloud Computing	3	0	0	3	3
YCAEE5	Distributed Database Management	3	0	0	3	3
YCAEE6	Image Processing	3	0	0	3	3
YCAEE7	Parallel Programming	3	0	0	3	3
YCAEE10	Bigdata Analytics	3	0	0	3	3

BUSINESS MANAGEMENT ELECTIVES

BM Elective I

Course Code	Course Title	L	T	P	H	C
YCABM3	Foundations of Decision Processes	3	0	0	3	3
YCABM4	Investment Technology	3	0	0	3	3
YCABM8	Management of Software Projects	3	0	0	3	3
YCABM9	Blockchain Technology	3	0	0	3	3

BM Elective II

Course Code	Course Title	L	T	P	H	C
YCABM1	Managerial Economics	3	0	0	3	3
YCABM2	Corporate Planning	3	0	0	3	3
YCABM5	Business Finance	3	0	0	3	3
YCABM6	Taxation Practices	3	0	0	3	3
YCABM7	MIS Frameworks and Implementation	3	0	0	3	3

YCA101- DATABASE MANAGEMENT SYSTEMS

Course Outcomes:

CO1	C	Knowledge	***Describe*** the database architecture and its application
CO2	C	Understand	***Describe*** about the relational model and algebra
CO3	C	Understand	***Explain*** the data model and accessing of data.
CO4	C	Knowledge	***Describe*** the normalization concept for a table of data
CO5	C	Understand	***Illustrate*** the query technical processing in database management

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCA101	**Data Base Management Systems**	**4**	**1**	**0**	**4**
C:P:A = 4:0:0		**L**	**T**	**P**	**H**
		4	**1**	**0**	**5**

UNIT- I: Introduction to database Management System **15**

Basic concepts-Database & Database Users-Characteristics of the Database-Database Systems-Concepts & Architecture-Date Models. Schemas & Instances-DBMS Architecture & Data Independence-Data Base languages & Interfaces-Data Modeling using the Entity-Relationship Approach

UNIT- II : Relational Model Concept **15**

Relational Model - Languages &Systems - Relational-Data Model & Relational -Algebra Relational Model Concepts-Relational Model Constraints-Relational Algebra-SQL – A Relational Database Language-Date Definition in SQL-View & Queries in SQL-Specifying Constraints & Indexes in SQL-Specifying Constraints & Indexes in SQL a Relational Database Management Systems-ORACLE/INGRES

UNIT- III : Data model **15**

Conventional Data Models & Systems Network-Data Model & IDMS Systems Membership types & options in a set DML for the network model-Navigation within a network database-Hierarchical Data Model & IMS System-Hierarchical Database structure- HSAM - HISAM - HDAM & HIDAM organization-DML for hierarchical model-Overview of IMS

UNIT- IV: Relational Data Base Design **15**

Relational Data Base Design-Function Dependencies & Normalization for Relational - Databases - Functional Dependencies-Normal forms based on primary keys (INF, 2NF, 3NF & BCNF)-Lossless join & Dependency preserving decomposition

UNIT- V: Concurrency Control & Recovery Techniques **15**

Concurrency Control & Recovery Techniques-Concurrency Control Techniques-Locking Techniques-Time stamp ordering-Granularity of Data items-Recovery Techniques-Recovery concepts-Database backup and recovery from catastrophic failures - Concepts of Object

oriented data base management systems

	LECTURE	TUTORIAL	TOTAL
	60	15	75

TEXT

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010.
2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition,2002

REFERENCES

1. Date, C.J., "An Introduction to Database Systems", Narosa Publishing House, NewDelhi.
2. Desai, B'., "An Introduction to Database Concepts", Galgotia Publications, New Delhi.
3. Elmsari and Navathe, "Fundamentals of Database Systems", Addison Wesley, New York.
4. Ullman, J.D., "Principles of Database Systems", Galgotia Publications, New Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	3	3	3	2	2	3	3
CO 2	3	3	3	2	2	2	2	2	3	3
CO 3	3	2	2	2	2	2	2	2	3	3
CO 4	2	3	2	2	2	2	2	2	2	2
CO 5	3	2	2	2	2	2	2	2	2	2
Total	14	13	12	11	11	11	10	10	13	13
Course	3	3	3	3	3	3	1	1	3	3

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

YCA102 COMPUTER NETWORKS

Course Outcomes:

CO1	C	Understand	***Define*** various methods of topology
CO2	C	Understand	***Understand*** and apply layer protocol
CO3	C	Understand	***Illustrate*** various counting and inclusion theory
CO4	C	Understand	***Describe*** LAN concepts
CO5	C	Understand	***Explain*** TCP/IP

Course Code	Course Name	L	T	P	C
YCA102	Computer Networks	4	1	0	4
C:P:A = 4:0:0		L	T	P	H
		4	1	0	5

UNIT- I: Introduction to computer network **15**

Advantages of networks - structure of the communications network - point-to-point and multi drop circuits - data flow and physical circuits - network topologies - topologies and design goals - Hierarchical topology - horizontal topology (Bus) - star topology - ring topology - mesh topology - The telephone network - switched and non-switched options - fundamentals of communications theory - channel speed and bit rate - voice communications and analog waveforms - bandwidth and the frequency spectrum - connecting the analog and digital worlds - digital worlds - digital signals - the modem - asynchronous and synchronous transmission - Wide area and local networks - connection oriented and connectionless networks, classification of communications protocols - time division multiple access (TDMA) - time division multiplexing (TDM) - carrier sense (Collision) systems - token passing - peer-to-peer priority systems - priority slot - carrier sense (collision free) systems - token passing (priority) systems.

UNIT- II: Layered Protocols and the OSI model **15**

Goals of Layered Protocols - network design problems - communication between layers - introduction to standard organizations and the OSI model - standards organizations - Layers of OSI - OSI status - Polling/Selection Protocols : Character and bit protocols - binary synchronous control (BSC) HDLC - HOLC options - HDLC frame format - code transparency and synchronization - HDLC transmission process - HDLC subsets - SDLC - Protocol conversion.

UNIT- III: Local Area Networks **15**

Way LANs - Primary attributes of a LAN - Broadband and baseband and base LANs - IEEE LAN standards - e1ationship of the 802 standards to the ISO/CCITT model - connection options with LANs - LLC and MAC protocol data units - LAN topologies and protocols - CSMA/CO and IEEE 802.3 - token ring (Priority) - token bus and IEEE 802.4 - metropolitan area networks (MANs) - ANSI fiber distributed data interface - Switching and Routing in Networks**:** Message switching - packet switching - when and when not to use packet switching - packet routing - packet switching support to circuit switching networks.

UNIT- IV: The X.25 Network and Supporting Protocols **15**

Features of X.25 - Layers of X.25 and the Physical layer - X.25 and the data link layer - companion standards to X.25 - features of X.25 - X.25 channel options - flow control principles - other packet types - X.25 logical channel states - packet formats - Internet working - connectionless mode networks - the frame relay and X.25 stacks.

UNIT- V: TCP/IP and Personal Computer Networks **15**

TCP/IP and internetworking - example of TCP/IP operations - related protocols ports and sockets - The IP address structure - major features of IP - IP datagram - Major IP services - IP source routing - value of the transport layer - TCP - Major features of TCP - passive and active operation - the transmission control block (TCP) - route discovery protocols - examples of route discovery protocols - application layer protocols

Personal computer communications: Characteristics - error handling - using the personal computer as a server - linking the personal computer to mainframe computers - tilt: transfer on personal computers - personal computers and local area networks - network operating systems (NOSs) - common IBM PC LAN protocol stacks.

	LECTURE	TUTORIAL	TOTAL
	60	15	75

TEXTBOOK

1. Andrew S. Tanenbaum, Computer Networks, Fourth Edition, Prentice Hall PTR; 4th edition, 2002
2. Computer Networking: A Top-Down Approach, by J. F. Kurose and K. W. Ross, Addison Wesley, 5th Edition, March 2009, ISBN-13: 978-0136079675. (Chapters 1-6)

REFERENCE

1. Black, V., "Computer Networks· Protocols, Standards and Interfaces", Prentice Hall of India, 1996
2. Stallings, W., "Computer Communication Networks", (4th edition). Prentice Hall of India.1993.Tanneabaum, A.S .. "Computer Networks", Prentice Hall of India, 19'81.

	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
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

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

YCA103 - OBJECT ORIENTED PROGRAMMING, ANALYSIS AND DESIGN

Course Outcomes

CO1 C Knowledge ***Describe*** various methods to define object modelling

CO2 C Understand ***Understand*** and construct modeling concepts

CO3 C Knowledge ***Describe*** and ***Discuss the*** concepts of operations

CO4 C Knowledge ***Describe*** and apply the concepts of designs

CO5 C Knowledge ***Describe*** the concepts of implementation of an application

Course Code	Course Name	L	T	P	C
YCA103	Object Oriented Programming, Analysis and Design	4	0	0	4
C:P:A = 4:0:0		L	T	P	H
		4	0	0	4

UNIT- I: Object modeling **12**

Object modelling: Objects and classes - Links and associations - Generalization and inheritance.

UNIT- II: Grouping constructs **12**

Grouping constructs - Aggregation - Generalization as extension and restriction -Multiple inheritance - Meta data - candidate keys - Dynamic modelling: Events and states Nesting – Concurrency

UNIT – III: Functional modeling **12**

Functional modelling: Data flow diagrams - Specifying operations - Analysis: Object modelling - Dynamic modelling - functional modelling - Adding operations - Iteration.

UNIT- IV: System design and object design **12**

System design: Subsystems - Concurrency - Allocation to processors and tasks - Management of data stores - Control implementation -. Boundary condition - Architectural frameworks - Object design: Optimization - implementation of control - Adjustment of inheritance - Design of associations - Documentation - Comparison of methodologies.

UNIT -V : Implementation **12**

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

LECTURE	TUTORIAL	TOTAL
60	0	60

TEXT

1. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education, 2005
2. Alan Dennis, Barbara H. Wixom, and David Tegarden, Systems Analysis And Design with UML Version 2.0—An Object-Oriented Approach, 3nd edition, John Wiley & Sons, Inc., 2009 (required)
3. T5. Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison Wesley.
4. OBJECT-ORIENTED ANALYSIS AND DESIGN With applications SECOND

EDITION Grady Booch Rational Santa Clara, California

REFERENCES

1. Booch, G., "Object Oriented Analysis and Design". 2nd edition, Benjamin/Cummins Publishing Co .. Redwood City, CA, U.S.A., 1994.
2. Rebecca Wirfs-Brock, et. al, Designing Object Oriented Software", Prentice Hall of India.1996.
3. Rumbaugh, J., Et al "Object Oriented Modelling and Design". Prentice Hall of India, New Delhi, 1991

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCA104-MANAGEMENT SUPPORT SYSTEMS

Course Outcomes

CO1	C	Knowledge	***Discuss*** about DSS concept and components
CO2	C	Understand	***Describe*** the data and model management for DSS
CO3	C	Knowledge	***Describe*** about various DSS functionality
CO4	C	Understand	***Understand*** the concept of DSS Interface and Group discussion
CO5	C	Understand	***Describe*** Expert System

Course Code	Course Name	L	T	P	C
YCA104	Management Support Systems	3	0	0	3
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3

UNIT- I: Introduction — **09**

Introduction to the concept of Decision Support System - Components of DSS - Dialogue Management

UNIT –II: Decision Support System — **09**

Data Management and Model Management for DSS - Examples of different type of DSS - Systems Analysis and Design for DSS

UNIT – III: DSS functionality — **09**

Models in the context of DSS - Algorithms and Heuristics - DSS Applications in different functions

UNIT- IV: Interface and Group Discussion — **09**

Design of interfaces in DSS - An overview of DSS generators - Group Decision in Support Systems (GDSS) and Decision Conferencing.

UNIT -V :Introduction of Expert Systems — **09**

Introduction of Expert Systems - Expert Systems in Management - Case Study on Expert System - Introduction to GlS - MSS based on GIS - Case Studies; Executive Information Systems (EIS).

LECTURE	TUTORIAL	TOTAL
45	0	45

TEXT

1. 1.Lucas, H.C., "Information system concepts for management", 5th edition, McGraw Hill,New York. 1994.
2. W S Jawadekar , A O'Brien .,"Management Information Systems"
3. Laaudon and Ludon, "Management Information Systems".

REFERENCES

1. Bhatnagar, S.C. and Ramani K. V., "Computers and Information Management", Prentice Hall of India. New Delhi, 1992.
2. Issue dedicated of GDSS & Expert Systems, JMIS, 10, 3, 1993-94.
3. Kroenke, D., "Management information systems", 2nd edition, Mitchell McGraw Hill, New York. 1992.
4. Maryam Alvi, "Group Decision support Systems, Info. Sys. Mgt (ISM)", Vol. 8. No.3 Summer 91 .
5. Sprauge, R.H., and McNurlin, B.C., "Information Systems Management in Practice", 3rd ed.
6. Prentice Hall international. New Jersey, 1993.
7. Sprague. R.H. and Carlson, E.D . ."Building Effective Decision Support Systems", Prentice Hall. New Jersey, 1982.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	1	1
CO 2	2	1	1	1	1	1	1	1	1	1
CO 3	2	2	1	1	1	1	1	1	1	1
CO 4	2	2	1	1	1	1	1	1	1	1
CO 5	1	2	1	1	1	1	1	1	1	1
Total	09	08	05	05	05	05	05	05	05	05
Course	03	02	01	01	01	01	01	01	01	01

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

YCA105 - MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

Course Outcomes:

CO1	C	Knowledge	***Discuss*** *the basic fundamentals of statistics and measures*
CO2	C	Understand	***Identify*** *the concept of sampling technique*
CO3	C	Knowledge	***Describe*** about the charts and analysis
CO4	C	Understand	***Discuss*** about the statistics analysis
CO5	C	Understand	***Describe*** *the various implementation*

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCA105	**Mathematical foundation for Computer Applications**	**4**	**1**	**0**	**5**
C:P:A = 5:0:0		**L**	**T**	**P**	**H**
		4	**1**	**0**	**5**

UNIT- I: Introduction	**15**
Basic Statistics: Measures of central tendencies - Measures of dispersion - Frequency distributions - Moments - Correlation coefficient - Regression.	
UNIT- II: Sampling statistical computing	**15**
Sampling: Theory of sampling - population and sample - Survey methods and estimation Statistical inference - Testing of hypothesis and inference	
UNIT- III: Statistics For Business	**15**
Computing frequency charts - Regression analysis.	
UNIT- IV: Data Analysis	**15**
Time series and forecasting	
UNIT- V: Implementation	**15**
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.

	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
Total	12	10	10	8	10	10	10	10	10	10
Course	3	2	2	1	2	2	2	2	2	2

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

YCA106 -DATABASE MANAGEMENT SYSTEMS LAB

Course Outcomes:

CO1	P	Guided response	***Build*** the concept of DBMS programming and its fundamental
CO2	P	Guided response	***Build*** an application program using concepts
CO3	P	Apply Guided Response	***Develop*** an application program using a data model ***Develop*** the query technical processing in database managements
CO4	P	Guided response	***Explain*** and ***implement***the normalization concept for a table of data
CO5	A	Apply	Apply the query technical processing in database managements

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCA106	**Database Management Systems Lab**	**0**	**0**	**4**	**2**
C:P:A = 0:1.5:0.5		**L**	**T**	**P**	**H**
		0	**0**	**4**	**4**
					60`

1. Create table in SQL using Accounting for a shop database
2. Develop a Database design in E-R model and Normalization using Database manager for a magazine agency or newspaper agency
3. Implement the Nested Queries using Ticket booking for performances
4. Create views for a particular table using Preparing greeting and birth day cards Personal accounts - insurance, loans, mortgage payments etc.
5. Implement Join operations in SQL using Doctor's diary, billing
6. create a program to implement JDBC connectivity using Personal bank account
7. create a program to implement ODBC connectivity using Class marks management
8. Create a webpage for Video tape library using JDBC Connectivity
9. How to update a data by using JDBC connectivity with Personal library.
10. Create a webpage for Class marks management library using JDBC Connectivity.
11. Write PL/SQL procedure for an application using Hostel accounting
12. Write PL/SQL procedure for an application using History of cricket scores
13. Write PL/SQL procedure for an application using Cable transmission program manager

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

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

YCA107 - MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS LAB USING JAVA

Course Outcomes:

CO1	P	Guided Response	***Practice*** *the basic* Computer generation of random numbers
CO2	A	Apply	***Understand*** and apply set theory and Relations
CO3	P	Guided Response	***Describe*** various counting and inclusion theory
CO4	A	Apply	***Apply*** frequency charts for large data sets
CO5	A	Apply	***Apply*** statistical package to perform factor analysis and tests of significance

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCA107	**Mathematical Foundation for Computer Applications Lab using Java**	**0**	**0**	**4**	**2**
C:P:A = 0:1:1		**L**	**T**	**P**	**H**
		0	**0**	**4**	**4**
					60

1. Computer generation of random numbers with different distributions.
2. Writing a questionnaire analysis program for data from surveys.
3. Analysis of significance of the results of survey.
4. Curve fitting to experimental data.
5. Programs to obtain frequency charts for large data sets and fitting a distribution.
6. Use of a statistical package to perform factor analysis and tests of significance.
7. Calculating and displaying regression statistics.
8. Real Statistics Using Excel
9. Calculating and displaying correlation statistics

LECTURE	**PRACTICAL**	**TOTAL**
0	**60**	**60**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

YCA201 ADVANCED OPERATING SYSTEMS CONCEPTS

Course Outcomes:

CO1	C	Understand	***Explain*** the operating system functions
CO2	C	Understand	***Implement*** the process and various process scheduling algorithms
CO3	C	Knowledge	***Outline*** process cooperation and inter process communication
CO4	C	Understand	***Describe*** various memory management concepts
CO5	C	Understand	***Implement*** and ***understand*** the file organization

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA201	**ADVANCED OPERATING SYSTEMS CONCEPTS**	**4**	**1**	**0**	**4**
C:P:A = 4:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	C++ concepts, Windows Programming	**4**	**1**	**0**	**5**

UNIT I OVERVIEW OF OPERATING SYSTEMS	**15**
Functionalities and objectives of operating Systems- processor register- instruction execution- interrupts- types of interrupts.	
UNIT II PROCESS MANAGEMENT	**15**
Process concepts: process states- process control block- process and threads- processor scheduling- scheduling algorithms.	
UNIT III PRINCIPLES OF CONCURRENCY	**15**
Critical Sections - Mutual Exclusion - Process Cooperation- Inter Process Communication- Deadlock Prevention- Detection- Avoidance- Semaphores- Monitors-Message Passing.	
UNIT IV MEMORY MANAGEMENT	**15**
Virtual Memory Concepts- Paging and Segmentation- Address Mapping- Virtual Storage Management- Page Replacement Strategies.	
UNIT V FILE ORGANIZATION	**15**
Blocking and buffering, file descriptor- file and directory structures- I/O devices- disk scheduling.	

	LECTURE	**TUTORIAL**	**PRACTICALS**	**TOTAL**
	60	**15**	**-**	**75**

TEXT

1. William Stallings, Operating Systems , Prentice Hall of India (P) Ltd, 7th edition-2012.
2. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, Sixth edition. Addison-Wesley (2003).

REFERENCES

1. Andrew Tanenbaum, "Modern Operating Systems", Pearson, 2008.
2. Silberschatz and P. B. Galvin, "Operating System Concepts", 7th Edition, Addison Wesley Publication.

E REFERENCES

1. http://www.nptel.ac.in/courses/106108101/
2. http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html
3. http://www.nptel.ac.in/downloads/106108101/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	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
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

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

YCA202 - SOFTWARE ENGINEERING

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define lifecycle models.
CO2	C	Understand	***Understand*** and analyse the software inspections
CO3	C	Knowledge	***Describe*** and ***apply*** various software tools
CO4	C	Understand	***Describe*** and ***solve*** issues in modern GUI
CO5	C	Understand	***Understand*** CASE tools and Software configuration management.

Course Code	Course Name	L	T	P	C
YCA202	Software Engineering	**4**	**1**	**0**	**4**
C:P:A = 4:0:0					
		4	**1**	**0**	**5**

UNIT- I: Software life cycle — **15**

Models: Waterfall, Spiral - Prototyping Fourth generation techniques - SW Process - Software requirements specification (SRS)Fact-Finding Techniques - Characteristics of a good SRS: Unambiguous. Complete - Verifiable - Consistent - Modifiable - Traceable and usable during the operation and Maintenance phase - Prototype outline for SRS.

UNIT- II: Software Inspection — **15**

Communication Skills for the System Analyst - Review/Inspection Procedure: Document. Composition of the inspection team - check list - reading by the inspectors - Recording of the defects and action recommended - Students should practice inspecting small requirement specifications for good characteristics.

UNIT- III: System Analysis and SW Design — **15**

SA tools & Techniques - DFD - Entity Relationship Diagrams - Project Dictionary - System Design Tools and Techniques - Prototyping - Structured Programming.

UNIT- IV: User Interface Design and User Manual — **15**

Elements of good design - Design issues - Features of a modern GUI - Menus - scrolling - windows - Icons - Panels - Error messages, etc.

User Profile - Contents of an User Manual: Student is urged to install and use a software using its user manual and report the strengths and weaknesses of that user manual.

UNIT- V: Software Configuration Management and CASE — **15**

Software Configuration Management

Base Line - SCM process - Version Control - Change Management.

Computer Aided Software Engineering

CASE - Tools for Project management Support - Analysis & design - Programming - Prototyping - Maintenance - Future of CASE.

	LECTURE	TUTORIAL	TOTAL
	60	15	75

TEXT

1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
3. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
4. Ian Sommerville, Software Engineering, Addison Wesley.
5. Kassem Saleh,"Software Engineering", Cengage Learning.
6. Pfleeger, Software Engineering, Macmillan Publication

REFERENCES

1.Beizer, B., ''Software Testing Techniques", Second Edition. Van Nostrand Reinhold. New York. 1990.
2.IEEE Guide to Software Requirements Specifications, Std 830-1984. In" IEEE Standards Collection. 1993. Available from IEEE Standards Board, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. NJ, USA.
3.IEEE Standard for Software User Documentation, Std 1063-1987.
4.Pressman, R.S., ''Software engineering" A Practitioner's Approach", Third Edition, McGraw Hill. International Edition, 1992.
5.Whitten, Bentley and Barlow, "System Analysis anc' Design Methods", Second Edition, Galgotia Publications, 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	2	2	1	1	1	2	2
CO 2	3	3	3	2	2	1	1	1	2	2
CO 3	3	3	3	2	2	1	1	1	2	2
CO 4	3	3	3	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	14	14	10	10	5	5	5	10	10
Course	3	3	3	2	2	1	1	1	2	2

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

YCA203 ADVANCED DATA STRUCTURES

Course Outcomes:

CO1	C	Understand	***Illustrate*** the classification of Linear Data Structures.
CO2	C	Understand	***Explain*** the functions of Non Linear Data Structures
CO3	C	Understand	***Describe*** the operations of Advanced Data Structures
CO4	C	Knowledge	***Explain*** the various algorithms of Data Structures
CO5	C	Understand	***Describe*** the concepts and procedures sorting.

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA203	**Advanced Data Structures**	**4**	**0**	**0**	**4**
C:P:A = 4:0:0					
		L	**T**	**P**	**H**
PREREQUISITE	C Programming	**4**	**0**	**0**	**4**

UNIT- I: LINEAR DATA STRUCTURES	**12**
Linear data Structures – Arrays, Records, Linked Lists – Singly, Doubly, Circular linked lists - Stack: Definition and examples, Representing Stacks - Queues: Definition and examples, priority queue, Dequeue, IRD, ORD – Applications of Stack, Queue and Linked Lists- Hashing	
UNIT –II: NON-LINEAR DATA STRUCTURES	**12**
Non-Linear data Structures - Binary Trees – Binary Tree Representations – node representation, internal and external nodes, implicit array representation - Operations on binary trees – Binary tree Traversals – Binary search trees- insertion, deletion, find. Graphs – Representation – Linked representation of Graphs – Graph Traversals.	
UNIT- III: ADVANCED CONCEPTS	**12**
Advanced data structures –Data structures for disjoint sets- AVL trees - Red-black trees – insertion and deletion – B-trees – Definition, insertion, deletion – Splay tree, Binomial heaps – operations.	
UNIT- IV: ALGORITHMS `	**12**
Single source shortest path algorithms – Bellman-Ford algorithm and Dijkstra's algorithm- Transitive closure -Topological sort – Trie Structures.	
UNIT- V: SORTING TECHNIQUES	**12**
Basic sorting techniques – selection sort, bubble sort, insertion sort - Merging and merge sort – Basic Search Techniques – linear search and binary search – recursive and non-recursive algorithms.	

	LECTURE	**TUTORIAL**	**PRACTICALS**	**TOTAL**
	60	**0**	**0**	**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	PSO 8	PSO 9
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	3	3	2	2	2	1	2	2	3	2
CO 5	3	2	2	2	2	1	2	2	3	2
Total	15	13	10	10	10	5	10	10	15	13
Course	3	3	2	2	2	1	1	1	3	3

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

YCA205 – ADVANCED OPERATING SYSTEM CONCEPTS LAB

Course Outcomes:

CO1	P	Guided Response	***Practice** the basic* scheduling algorithms
CO2	A	Apply	***Understand*** and apply algorithms to avoid dead lock
CO3	P	Guided Response	***Practice the*** various page replacement algorithms
CO4	A	Apply	***Apply*** the algorithms for optimal page replacement
CO5	A	Apply	***Apply*** the linear, non-linear and sorting algorithms

Course Code	Course Name	L	T	P	C
YCA205	Advanced Operating System Concepts Lab	0	0	4	2
C:P:A = 0:1:1		L	T	P	H

		0	0	4	4
					60

1. Simulate the FCFS - CPU Scheduling Algorithms
2. Simulate the SJF - CPU Scheduling Algorithms.
3. Simulate the Priority - CPU Scheduling Algorithms.
4. Simulate the Round Robin - CPU Scheduling Algorithms
5. Simulate MVT and MFT
6. Simulate Bankers algorithm for Deadlock Avoidance
7. Simulate FIFO Page Replacement Algorithms
8. Simulate LRU Page Replacement Algorithms
9. Simulate Optimal Page Replacement Algorithms
10. Implement linear and nonlinear data structures to solve real-time problems
11. Perform searching and sorting techniques of data structures to different application domains

LECTURE	PRACTICAL	TOTAL
0	60	60

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

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

YCA206- CASE TOOLS LAB

Course Outcomes:

CO1	P	Guided Response	***Manipulate*** various methods to define CASE tools
CO2	P	Set	***Developing*** Relational databases
CO3	P	Guided Response	***Describe*** and ***implement*** various Application development tools
CO4	P	Set	***Describe*** and ***solve*** problems in developing application software
CO5	P	Guided Response	***Developing*** Management tools

Course Code	Course Name	L	T	P	C
YCA206	Case Tools Lab	0	0	4	2
C:P:A = 0:2:0					
		L	T	P	H

		0	0	4	4
					60

The lab sessions will have experiments on the following:

1. Use of diagramming tools for system analysis, such as Turbo analyst, for preparing Data Flow diagrams and E-R diagrams.
2. Use of tools for relational database design such as relational Designer.
3. Identify Use Cases and develop the Use Case model.
4. Identify the conceptual classes and develop a domain model with UML Class diagram
5. Draw relevant state charts and activity diagrams.
6. Use of toots such as Power Builder, Delphi, Magic etc. in developing application software including interactive data-entry screens,
7. Transaction processing
8. Report Generations, etc.
9. Use of tools for managing the process of software development such as Source Code Control System (SCCS).
10. Revision Control System (RCS), Make etc.

References

Products manuals from concerned vendors

Keminghan, B.W., Pike, R., '6'fbe Unix Programming Environment", Prentice Hall of India, New Delhi, 1984.

	LECTURE	PRACTICAL	TOTAL
	0	60	60

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCA301-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define AI techniques
CO2	C	Understand	***Understand*** and apply set theory and Relations
CO3	C	Knowledge	***Describe*** and ***apply*** various counting and Predicate Logic
CO4	C	Understand	***Describe*** and ***solve*** problems in Probabilistic reasoning
CO5	C	Understand	***Understand*** Concept of learning the expert systems

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA301	**Artificial Intelligence and Machine Learning**	**4**	**0**	**0**	**4**
C:P:A = 4:0:0					
		L	**T**	**P**	**H**
		4	**0**	**0**	**4**

UNIT –I: AI Techniques	**12**
AI techniques-search knowledge, abstraction- natural language processing- vision and speech processing- Games-theorem proving- robotics - expert systems.	
UNIT -II : State Space Search	**12**
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	**12**
Minimax search: Alpha-Beta cut offs- Predicate Logic : Skolemizing queries - Unification. Modus pone - Resolution - dependency directed backtracking	
UNIT- IV: Backtracking	**12**
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	**12**
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**
60	**0**	**60**

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
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

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

YCA302-GRAPHICS AND MULTIMEDIA

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define line-drawing algorithms
CO2	C	Understand	***Understand*** and apply 2d and 3d transformations
CO3	C	Knowledge	***Describe*** and ***apply*** various types multimedia applications
CO4	C	Understand	***Describe*** and ***solve*** problems in development tools
CO5	C	Understand	***Understand*** hypermedia

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA302	**Graphics and Multimedia**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		3	**0**	**0**	**3**

UNIT -I : OUTPUT PRIMITIVES	**09**
Points and lines – Line-drawing algorithms – DDA algorithm – Bresenham's line algorithm – Attributes of output primitives: Line attributes – Area-fill attributes – Character attributes – Bundled attributes	
UNIT- II: 2D AND 3D TRANSFORMATIONS	**09**
Two-dimensional Geometric transformations: Basic transformations – Matrix representations – Composite transformations – Three-Dimensional object representations − Three-Dimensional geometric and modeling transformations − Three-Dimensional viewing − Hidden surface elimination − Color models – Virtual reality – Animation	
UNIT- III: MUTLIMEDIA	**09**
Multimedia basics − Multimedia applications − Multimedia system architecture − Evolving technologies for multimedia − Defining objects for multimedia systems − Multimedia data interface standards − Multimedia databases	
UNIT- IV: MULTIMEDIA	**09**
Technology: Development Tools – Image – Audio – Video- 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	**09**
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	

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

TEXT

1. Donald Hearn and M.Pauline Baker, Computer Graphics in C Version, Fifth Edition, Pearson Education, 2015.
2. Andleigh, P. K and Kiran Thakrar , Multimedia Systems and Design, PHI, 2003.
3. Judith Jeffcoate , Multimedia in Practice: Technology and Practice., Pearson Education, 2014

REFERENCES

1. William M. Neuman, Robert R. Sprout, Principles of interactive Computer Graphics, McGraw Hill International Edition.
2. Buford J. F Koegel, Multimedia Systems, Twelfth Indian Reprint, Pearson Education

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	3	3	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	3	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	15	14	11	11	11	5	10	10	13	13
Course	3	3	3	3	3	1	1	1	3	3

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

YCA303- OPTIMIZATION TECHNIQUES

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define simplex method
CO2	C	Understand	***Understand*** and apply branch and bound method.
CO3	C	Knowledge	***Describe*** and ***apply*** various queuing theory
CO4	C	Understand	***Describe*** and ***solve*** problems in inventory theory
CO5	C	Understand	***Understand*** PERT and CPM path.

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA303	**Optimization Techniques Linear Programming**	**4**	**0**	**0**	**4**
C:P:A = 4:0:0					
		L	**T**	**P**	**H**
		4	**0**	**0**	**4**

UNIT- I: Introduction to Optimization Techniques — **12**

Graphical method for two dimensional problems - Central problem of linear programming various definitions - statements of basic theorems and properties - Phase I and Phase II of the simplex method - revised simplex method - primal and dual - dual simplex method.

UNIT- II: Integer Programming — **12**

Sensitivity analysis transportation problem and its solution - assignment problem and its solution by Hungarian method- Gomorra cutting plane methods - Branch and Bound method

UNIT- III: Queuing Theory — **12**

Characteristics of queuing systems - steady state Mimi, MlMit/K and MIMIC queueing models- Replacement of items that deteriorate - Replacement of items that fail Group replacement and individual replacement.

UNIT- IV: Inventory Theory — **12**

Costs involved in inventory problems - single item deterministic models-economic lot size models without shortages and with shortages having production rate infinite and finite.

UNIT- V: PERT and CPM — **12**

Arrow networks - time estimates- earliest expected time, latest allowable occurrence time and slack - critical path - probability of meeting scheduled date of completion of project- calculations on CPM network - various floats for activities - critical path - updating project - operation time cost trade off curve - project time cost trade off curve - selection of schedule based on cost analysis.

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

TEXT

1. Hamdy A.TAHA.,"Operations research- An Introduction", 8th edition, Pearson Education,Inc,2007.

REFERENCES

1. Karnbo, N.S., "Mathematical Programming Techniques", McGraw Hill, New York. 1985.
2. Kanti Swarup, Gupta, P.K., and Man Mohan, "Operations Research", Sultan Chand & Sons-New Delhi. 1990.
3. Mital K. V., "Optimization Methods In Operations Research and System Analysis", New Age International (P) Ltd., New Delhi, 1992.
4. Saffer, L.R., Fitter J.B., and MeyerW.L., "The Critical Path Method". McGraw Hill. New York. 1990.
5. Taha, H.A., "Operations research- An Introduction", McMillan Publishing co .• New York, 1986.
6. 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	2	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	2	2	2	2	2	1	1	1	2	2
CO 5	3	2	2	2	2	1	1	1	2	2
Total	13	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCA304- ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB

Course Outcomes:

CO 1	P	Guided Response	***Manipulate*** various methods to define AI techniques
CO 2	P	Set	***Starts*** and apply set theory and Relations
CO 3	P	Guided Response	***Develop*** and ***implement*** various counting and Predicate Logic
CO 4	P	Guided Response	***Develop*** and ***solve*** problems in Probabilistic reasoning
CO 5	P	Set	***Build*** Concept of learning the expert systems

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA304	**Artificial Intelligence and Machine Learning Lab**	**0**	**0**	**3**	**2**
C:P:A = 0:2:0					
		L	**T**	**P**	**H**
		0	**0**	**0**	**3**
					45

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	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

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

YCA305-OPTIMIZATION TECHNIQUES LAB

Course Outcomes:

CO1	P	Guided Response	***Manipulate*** various methods to define simplex method
CO2	P	Set	***Starts*** and apply branch and bound method.
CO3	P	Guided Response	***Develop*** and ***implement*** various queuing theory
CO4	P	Guided Response	***Develop*** and ***solve*** problems in inventory theory

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA305	**Optimization Techniques Lab**	**0**	**0**	**4**	**2**
C:P:A = 0:2:0		**L**	**T**	**P**	**H**
		0	**0**	**4**	**4**
					60

To develop computer programs for the following and to test with suitable numerical examples

1. Graphical method to solve two dimensional Linear Programming Problem.
2. Revised Simplex method to solve n-dimensional Linear Programming Problem
3. Dual Simplex method to solve n-dimensional Linear Programming Problem.
4. Solution of Transportation problem.
5. Gomory cutting plane methods for Integer Programming Problems
6. Branch and Bound method to solve Integer Programming Problem.
7. M/M/1/N AND M/M/C queuing problems.
8. Single item deterministic inventory model problems with/without shortage and finite/infinite production rate.
9. To draw the PERT/CPM networks.
10. Calculations of PERT analysis
11. Calculation of CPM analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

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

COURSECODE	COURSE NAME	L	T	P	C
YCA306	Industrials Lectures	0	0	2	2
C:P:A = 0:2:0					
		L	T	P	H
		0	0	2	2

CO1 P Guided Response Identifying the Recent Technologies

CO2 P Guided Response Preparing the content/Arranging the Seminar

CO3 P Guided Response Attending the Lectures

CO4 P Guided Response Implementing the Lectures

CO5 P 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

COURSECODE	COURSE NAME	L	T	P	C
YCA307	Mini Project	0	0	3	2
C:P:A = 0:2:0					
		L	T	P	H
		0	0	3	3

CO1 P Guided Response Practice the Requirements Analysis

CO2 P Guided Response Create the Design for their project

CO3 P Guided Response Create the Coding

CO4 P Guided Response Plan for Testing

CO5 P Guided Response Solve the Conclusion

	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

COURSECODE	COURSE NAME	L	T	P	C
YCA401	Research Methodology(Paper Publications)	0	0	3	3
C:P:A = 0:3:0					
		L	T	P	H
		0	0	3	3

CO1 P Guided Response Identifying the Topic

CO2 P Guided Response Preparing the content/Arranging the Seminar

CO3 P Guided Response Presenting the content

CO4 P Guided Response Addressing the Audience

CO5 P 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

COURSECODE	COURSE NAME	L	T	P	C
YCA402	Project Work	0	0	6	12
C:P:A = 0:3:2					
		L	T	P	H
		0	0	6	6

CO1 P Guided Response Practice the Requirements Analysis

CO2 P Guided Response Develop the Design of the project

CO3 P Guided Response Create the Coding

CO4 P Guided Response Plan for Testing

CO5 P Guided Response Solve the problem and Write Conclusion

	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

YCAEE1 DATA MINING AND DATA WAREHOUSING

Course Outcomes:

CO1	C	Understand	***Explain*** the concepts of data mining
CO2	C	Understand	***Describe*** and ***implement*** the concept of association rule mining
CO3	C	Understand	***Describe*** and ***implement*** the concept of classification and clustering the datasets .
CO4	C	Understand	***Describe*** and ***implement*** various types data warehouse tools
CO5	C	Understand	***illustrate*** the different types of mining concepts and its applications

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE1	DATA MINING AND DATA WAREHOUSING	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
		4	0	0	4

UNIT I FUNDAMENTALS — **12**

Fundamentals of Statistics – Databases – Data Mining Functionalities – Steps in Data Mining Process– Architecture of a typical Data Mining Systems – Classification of Data Mining Systems –Overview of Data Mining Techniques-Major issues in data mining.

UNIT IIDATA PREPROCESSING AND ASSOCIATION RULES — **12**

Data Pre-processing: Data Cleaning– Data Integration– Data Transformation – Data Reduction– Concept Hierarchies – Concept Description- Data Generalization - Data Summarization- Data Characterization– Mining Association Rules in Large Databases.

UNIT IIIPREDICTIVE MODELING — **12**

Classification and Prediction Issues Regarding Classification and Prediction–Classification by Decision Tree Induction – Bayesian Classification – Other Classification Methods – Prediction – Clusters Analysis Types of Data in Cluster Analysis – Categorization of Major Clustering Methods Partitioning Methods – Hierarchical Methods

UNIT IVDATA WAREHOUSING — **12**

Data Warehousing Components – Multi Dimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – Mapping the Data Warehouse to Multiprocessor Architecture – OLAP – Need – Categorization of OLAP Tools.

UNIT V APPLICATIONS — **12**

Applications of Data Mining – Social Impacts of Data Mining – Tools – An Introduction to DB Miner – Case Studies – Mining WWW – Mining Text Database – Mining Spatial Databases.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
60	-	-	60

TEXT

1. Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, Morgan Kaufmann Publishers, 2002.

REFERENCES

1. Alex Berson and Stephen J. Smith, Data Warehousing- Data Mining & OLAP, TMH, 2011.
2. Usama M.Fayyad et. Al., Advances in Knowledge Discovery and Data Mining, The M.I.T Press, 2009.
3. Ralph Kimball, The Data Warehouse Life Cycle Toolkit, John Wiley & Sons Inc., 2008.

E REFERENCES

1. https://www.tacoma.uw.edu/sites/default/files/sections/InstituteTechnology/TCSS555_Dat

amining.pdf
2. *http://www.kdnuggets.com/data_mining_course/syllabus.html*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	0	1	0	2	0	0	1	3
CO 2	3	2	1	1	0	0	2	0	1	2
CO 3	2	2	1	2	0	0	2	0	0	2
CO 4	2	0	2	1	0	0	2	0	2	2
CO 5	2	0	2	2	0	0	0	0	2	2
Total	12	6	6	7	0	2	6	0	6	11
Course	3	2	2	2	0	1	2	0	2	3

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

YCAEE2 HIGH PERFORMANCE COMPUTING

Course Outcomes:

CO1 C Understand ***Explain*** the concepts of processors and models
CO2 C Understand ***Describe*** the architecture and memory design

CO3 C Understand ***Describe*** the design issues in parallel computing.

CO4 C Understand ***Describe*** the limitations of parallel computing and power aware techniques
CO5 C Understand ***illustrate*** the different types of advanced concepts

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE2	HIGH PERFORMANCE COMPUTING	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
		4	0	0	4

UNIT I CONCEPTS **12**

Parallel Processing Concept :Levels of parallelism (instruction, transaction, task, thread, memory, function)- Models (SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven Computation etc)- Architectures: N-wide superscalar architectures, multi-core, multi-threaded

UNIT IIPARALLEL PROGRAMMING WITH CUDA **12**

Parallel Programming with CUDA : Processor Architecture, Interconnect, Communication, Memory Organization, and Programming Models in high performance computing architectures: (Examples: IBM CELL BE, Nvidia Tesla GPU, Intel Larrabee Micro-architecture and Intel Nehalem micro - architecture- Memory hierarchy and transaction specific memory design- Thread Organization

UNIT IIIISSUES **12**

Fundamental Design Issues in Parallel Computing : Synchronization- Scheduling- Job Allocation- Job Partitioning- Dependency Analysis- Mapping Parallel Algorithms onto Parallel Architectures- Performance Analysis of Parallel Algorithms

UNIT IVLIMITATIONS **12**

Fundamental Limitations Facing Parallel Computing and power aware techniques : Bandwidth Limitations- Latency Limitations- Latency Hiding/Tolerating Techniques and

their limitations- Power- aware Processing Techniques-Power-aware Memory Design- Power-aware Interconnect Design- Software Power Management.

UNIT V ADVANCED TOPICS **12**

Petascale Computing-Optics in Parallel Computing- Quantum Computers- Recent developments in Nanotechnology and its impact on HPC

LECTURE	TUTORIAL	PRACTICAL	TOTAL
60	-	-	60

TEXT

1. George S. Almasi and AlanGottlieb, Highly Parallel Computing, Benjamin Cumming Publishers.
2. Kai Hwang ,Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw Hill 1993
3. David Culler, Jaswinder Pal Singh, Anoop Gupta, Parallel Computer Architecture: A hardware/Software Approach, Morgan Kaufmann, 1999.
4. K. Hwang& Z. Xu, Scalable Parallel Computing – Technology, Architecture, Programming., McGraw Hill 1998.

REFERENCES

1. William James Dally and BrianTowles, Principles and Practices on Interconnection Networks, Morgan Kauffman 2004.
2. Hubert Nguyen , GPU Gems 3, Addison Wesley, 2008, (Chapter 29 to Chapter 41).
3. AnanthGrama, Anshul Gupta, George Karypis, and Vipin Kumar, Introduction to Parallel Computing, , 2nd edition, Pearson, 2003.
4. David A. Bader (Ed.), Petascale Computing: Algorithms and Applications, Chapman & Hall/CRC, 2008

.

E REFERENCES

1. https://nptel.ac.in/courses/106/108/106108055/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	0	1	0	2	0	0	1	3
CO 2	3	2	1	1	0	0	2	0	1	2
CO 3	2	2	1	2	0	0	2	0	0	2
CO 4	2	0	2	1	0	0	2	0	2	2
CO 5	2	0	2	2	0	0	0	0	2	2
Total	12	6	6	7	0	2	6	0	6	11
Course	3	2	2	2	0	1	2	0	2	3

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

YCAEE3-COMPILER DESIGN

Course Outcomes:

	Domain	Level	Course Outcomes
CO1	C	Understand	***Explain*** the concept of Compiler designing
CO2	C	Understand	***Understand*** the concept of parser Theory
CO3	C	Understand	***Understand*** the concept syntax analysis
CO4	C	Understand	***Understand*** the handling techniques
CO5	C	Understand	***Understand*** the code generation

Course Code	Course Name	L	T	P	C
YCAEE3	Compiler Design	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
		4	0	0	4

UNIT- I : Introduction — **12**

Classification of grammars. Context free grammars. Deterministic finite state automata (DFA) Non-DFA.

UNIT- II: Parsing Theory- Syntax Analyzer — **12**

Scanners. Top down parsing, LL grammars. Bottom up parsing. Polish expressions Operator precedence grammar. IR grammars. comparison of parsing methods. Error handling.

UNIT- III: Runtime Environment — **12**

Symbol table handling techniques. Organization for non-block and block structured languages. Run time storage administration. Static and dynamic allocation.

UNIT- IV: Syntax Analysis — **12**

Intermediate forms of source program. Polish N-tuple and syntax trees. Semantic analysis and code generation.

UNIT- V: Code Optimization and Code Generation — **12**

Code optimization. Folding, redundant sub-expression evaluation. Optimization within iterative loops.

LECTURE	TUTORIAL	TOTAL
60	-	60

TEXT Books

1. Murray, el.al "The Visual C++ Handbook", 2nd edition. Osborne McGraw Hill. New York. 1996.

REFERENCES

1. Tremblay, et. al, "The Theory and Practice of Compiler Writing". McGraw Hill, New York,
2. Keith D Cooper and Linda Torczon, “Engineering a Compiler”, Morgan Kaufmann Publishers Elsevier Science, 2004.
3. Charles N. Fischer, Richard. J. LeBlanc, “Crafting a Compiler with C”, Pearson Education, 2008.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCAEE8 SYSTEM ANALYSIS AND SIMULATION

Course Outcomes:

CO1 C Knowledge ***Define*** Role of modeling

CO2 C Understand ***Describe*** Generation of Pseudo-Random Numbers

CO3 C Knowledge ***Outline*** *the* simulating queuing systems

CO4 C Knowledge ***Describe*** Simulation of Systems

CO5 C Understand ***Understand*** Cases on Simulation

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCAEE8	**System Analysis and Simulation**	**4**	**0**	**0**	**4**
C:P:A =4:0:0					
		L	**T**	**P**	**H**
		4	**0**	**0**	**4**
UNIT- I : (Systems Analysis)					**12**

Role of Modeling in Systems Analysis: Computer Simulation of Stochastic Systems';	
UNIT- II: (Simulation of Queuing Systems)	**12**
Generation of Pseudo-Random Numbers- and Stochastic Variates using the computer; - Simulation of Queuing Systems	
UNIT -III: (Simulation Languages)	**12**
Using special purpose languages for simulating queuing systems- GPSS and/or SLAM-System Dynamics	
UNIT- IV: (System Dynamics with Dynamo)	**12**
Simulation of Systems with Feedback; using DYNAMO in System Dynamics;	
UNIT -V :(Simulation on Business)	**12**
Cases on Simulation in Production-Finance, Marketing, and Corporate Planning; Project Work	

LECTURE	TUTORIAL	TOTAL
60	0	60

TEXT

1. Kamal, Raj, Embedded Systems: Architecture, Programming & Design, Tata McGraw Hill, 2ndEd.,2008

2.Jerry Banks, John S. Carson, Barry L. Nelson, David M. Nicol “Discrete – Event system simulation”, Pearson education.

REFERENCES

1 Banks, J., Catson, S., Nelson, B.L., "Discrete-Event System Simulation", (2nd Edition). Prentice Hall of India, N. Delhi, 1996.

2. Deo, N., "System Simulation with Digital Computers". Prentice Hall of India, 1979.

Law, A.M., and Kelton, W.D., "Simulation Modelling and Analysis", (2nd Edition). McGraw Hill, N. Y, 1991.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCAEE9 CRYPTOGRAPHY AND INFORMATION SECURITY

Course Outcomes:

CO1	U	Understand	***Understand*** the overview of the cryptography basics model**.**
CO2	U	Understand	***Describe*** the idea of cryptography algorithm
CO3	K	Knowledge	***Analyze*** various security technology
CO4	K	Knowledge	***Describe*** intrusion detection and prevention
CO5	U	Understand	***Understand*** the implementation of security and change management

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE9	CRYPTOGRAPHY AND INFORMATION SECURITY	4	0	0	4
C:P:A 4:0:0					
		L	T	P	H
		4	0	0	4

UNIT I OVERVIEW **12**

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 IIALGORITHMS **12**

Simplified DES- Key Management, Diffe-Hellman Key Exchange, Ellipric Curve Arithmetic, Elliptic Curve Cryptography.

UNIT IIIPLANNING FOR SECURITY **12**

Information Security Planning and Governance-Information Security Policy, Standards, and Practices -The Information Security Blueprint -Security Education, Training, and Awareness Program -Continuity Strategies.

UNIT IVFIREWALLS AND VPNS **12**

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 **12**

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
60	-	60

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	0	2	1	2	1	1	3	0
CO 2	3	1	0	2	1	2	1	1	3	1
CO 3	3	2	0	2	1	1	1	1	3	1
CO 4	3	2	0	2	1	2	1	1	3	0
CO 5	3	2	0	2	1	2	1	1	3	1
Total	15	9	0	10	5	9	5	5	15	3
Course	3	2	0	2	1	2	1	1	3	1

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

YCAEE4 CLOUD COMPUTING

Course Outcomes:

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

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCAEE4	**CLOUD COMPUTING**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		3	**0**	**0**	**3**

UNIT I CLOUD COMPUTING FOUNDATION **09**

Introduction to Cloud Computing- Move to Cloud Computing-Types of Cloud-working of Cloud computing- Cloud Computing Technology.

UNIT II DATA STORAGE AND VIRTUALIZATION **09**

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 **09**

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 **09**

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			09
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. A.Srinivasan, J. Suresh , Cloud Computing – A Practical Approach for learning and Implementation, , Pearson Education, 2014.

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	3	3	2	2	2	1	1	2	2
CO 2	3	3	3	2	2	2	1	1	2	2
CO 3	3	3	3	2	2	2	1	1	2	2
CO 4	3	3	3	2	2	2	1	1	2	2
CO 5	2	2	2	2	2	2	1	1	2	2
Total	14	14	14	10	10	10	5	5	10	10
Course	3	3	3	2	2	2	1	1	2	2

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

YCAEE5 - DISTRIBUTED DATABASE MANAGEMENT

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define levels of distributed database design
CO2	C	Understand	***Understand*** and apply time based and quorum based protocols
CO3	C	Knowledge	***Describe*** and ***apply*** various types of protocols
CO4	C	Understand	***Describe*** and ***solve*** problems in distributed data dictionary management
CO5	C	Understand	***Understand*** SQL server

COURSE CODE	COURSE NAME	L	T	P	C

YCAEE5	**Distributed Database Management**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		3	**0**	**0**	**3**

UNIT- I :Distributed Database Design **09**

Distributed DBMS features and needs - Reference architecture- Levels of distribution transparency, replication- Distributed database design - fragmentation, allocation criteria- Storage mechanisms.

UNIT- II:Global Query Optimization **09**

Translation of global queries /Global query optimization- Query execution and access plan- Concurrency control - 2 phase locks- Distributed deadlocks- Time based and quorum based protocols- Comparison

UNIT- III: Types of Protocols **09**

Reliability - non-blocking commitment protocols-Partitioned networks-Checkpoints and cold starts-Management of distributed transactions - 2 phase unit protocols- Architectural aspects.

UNIT- IV: Distributed Data Dictionary Management **09**

Node and link failure recoveries-Distributed data dictionary management- Distributed database administration.-Heterogeneous databases-federated database, reference architecture, loosely and tightly coupled.

UNIT- V: SQL Server **09**

Alternative architectures- Development tasks, Operation - global task management-Client server databases-SQL server, open database connectivity- Constructing an application.

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

TEXT

1. Elim asri.navathe- “Fundamentals of Database Management Systems”- 6th edition ,Addison Welsey.
2. M.Tamer Ozsu,Patrick valduriez “principles of distributed database systems ”-3rdedition ,Springer science +Business Media ,LLC 2011.

REFERENCES

1. Ceri, S .. Pe1agatti. G., "Distributed Databases: Principles and System', McGraw Hill. New York, 1985.

	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	3	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	15	14	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

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

YCAEE6 – IMAGE PROCESSING

Course Outcomes:

	Domain	Level	
CO1	Cognitive	Understand	***Describe*** the basics of digital image fundamentals.
CO2	Cognitive	Knowledge	***Understand*** the classifications of Image Processing techniques.
CO3	Cognitive	Knowledge Apply	***Describe*** and ***apply*** various types of feature extraction techniques applicable for image vision.
CO4	Cognitive	Understand Apply	***Describe*** and ***solve*** problems in encoding images based on the concept of Fourier transforms.
CO5	Cognitive	Knowledge	***Define*** the concept of filtering and Restorations.

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCAEE6	**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	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCAEE7 – PARALLEL PROGRAMMING

Course Outcomes:

	Domain	Level	
CO1	C	Understand	***Describe*** the basics of Parallel Programming techniques.
CO2	C	Knowledge	***Understand*** the concept of Data dependency

CO3	C	Knowledge Apply	***Describe*** and ***apply*** various types of Performance analysis
CO4	C	Understand	***Describe*** and ***solve*** problems in Parallel Programming
CO5	C	Understand	***Understand the*** Methods for Applying in Programming parallel.

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCAEE7	Parallel Programming	**3**	**0**	**0**	**3**
		L	**T**	**P**	**H**
C:P:A = 3:0:0		**3**	**0**	**0**	**3**

UNIT- I: Parallel Programming- Introduction	**9**
Processes and processors. Shared Memory. Fork. Join constructs. Basic parallel programming techniques-loop splitting, spin locks, contention barriers and row conditions.	
UNIT- II: Data dependency and Scheduling	**9**
Variations in splitting, self and indirect scheduling. Data dependency-Forward and Backward. Block scheduling.	
UNIT- III: Performance Analysis	**9**
Linear recurrence relations. Backward dependency. Performance tuning overhead with number of processes, effective use of cache.	
UNIT- IV: Parallel Programming – Problems	**9**
Parallel programming examples: Average, mean squared deviation, curve fitting, numerical integration, travelling salesman problem, Gaussian elimination. Discrete event time simulation.	
UNIT- V: Parallel Programming Methods	**9**
Parallel Programming constructs in HPF, Fortran 95. Parallel programming under Unix.	

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

TEXT

1.Roosta, Seyed H," Parallel Processing and Parallel Algorithms", 2016.

REFERENCES

1.Brawer, S., "Introduction to parallel programming", Academic Press, New York, 2005.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	2	2	2	1	1	2	2

CO 2	3	3	3	2	2	2	1	1	2	2
CO 3	3	3	3	2	2	2	1	1	2	2
CO 4	3	3	3	2	2	2	1	1	2	2
CO 5	2	2	2	2	2	2	1	1	2	2
Total	14	14	14	10	10	10	5	5	10	10
Course	3	3	3	2	2	2	1	1	2	2

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

YCAEE10 BIGDATA ANALYTICS

Course Outcomes:

CO1	C	Knowledge	***Understand*** the fundamentals of various big data analysis techniques
CO2	C	Understand	***Identify*** the architecture, infrastructure and delivery models of stream computing
CO3	C	Analyse	***Analyze*** the HADOOP and Map Reduce technologies
CO4	C	Understand Apply	***Apply*** efficient algorithms for mining the data from large volumes
CO5	C	Apply	***Explore*** on Big Data applications Using Pig and Hive

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCAEE10	**BIGDATA ANALYTICS**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		3	**0**	**0**	**3**

UNIT I INTRODUCTION TO BIGDATA	**09**
Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.	
UNIT II MINING DATA STREAMS	**09**
Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.	
UNIT III HADOOP	**09**
History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features	
UNIT IVHADOOP ENVIRONMENT	**09**

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud

UNIT V FRAMEWORKS **09**

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

LECTURE	TUTORIAL	TOTAL
45	0	45

TEXT

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012
3. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012

REFERENCES

1. Da Ruan,Guoquing Chen, Etienne E.Kerre, Geert Wets, Intelligent Data Mining, Springer,2007
2. Michael Minelli, Michele Chambers, Ambiga Dhiraj , Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses,Wiley, Publications,2013
3. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, 2011

E REFERENCES

http://www.edureka.co/big-data-and-ha...

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	1	2	2	1	1					1
CO 2	1	2	2	1				3	1	2
CO 3	2	2	2	1	1			3	1	
CO 4	1	2	3	1				3	2	
CO 5	2	3	3	1				3	2	3
Total	7	11	12	5	2			12	6	6
Course	2	3	3	1	1			3	2	2

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

YCABM1 -MANAGERIAL ECONOMICS

Course Outcomes:

CO1 C Knowledge ***Describe*** Nature and scope of managerial economics

CO2 C Understand ***Define*** and measure elasticity.

CO3 C Knowledge ***Describe*** Product and cost analysis

CO4 C knowledge ***Describe*** Production function

CO5 C Understand ***Understand*** product and profits

COURSE CODE	COURSE NAME	L	T	P	C
YCABM1	Managerial Economics	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

UNIT- I: (Features of managerial economics) **9**

Nature and scope of managerial economics. Objectives of the firm .Managerial and behavioral theories of the firm.

UNIT- II: (Concepts of demand forecasting) **9**

Concepts of opportunity cost- incremental - time perspective. Principles of discounting and equimargins - Demand analysis - purposes and concepts - Elasticity of demand - Methods of demand forecasting.

UNIT – III: (Product and cost analysis) **9**

Product and cost analysis- short run and long run average cost curves - Law of supply - Economies and diseconomies of scale-Law of variable proportions

UNIT- IV : (Product and price) **9**

Production function - single output isoquants- Pricing: Prescriptive approach.- Price determination under perfect competition.

UNIT -V : (Profits and Break-even analysis) **9**

Monopoly, oligopoly and monopolistic competition - Full cost pricing- product line pricing- Pricing strategies - Profits: Nature and. measurement policy. Break-even analysis.Case study.

LECTURE	TUTORIAL	TOTAL
45	0	45

TEXT

1. Managerial Economics- Theory and Applications, Dr. D.M Mithani, Himalaya Publications
2. Managerial Economics, D.N Dwivedi, 6th ed., Vikas Publication.
3. Managerial Economics, H. L Ahuja, S. Chand, 2011
4. Indian Economy, K P M Sundharam and Dutt, 64th Edition, S Chand Publication.
5. Business Environment Text and Cases by Justin Paul, 3rd Edition, McGraw-Hill Companies.

REFERENCES

1.Dean. J .."Management Economics".Prentice Hall of India, New Delhi. 1982.

2.Mote.V.L..et al. "Managerial Economics: Concepts and Cases". Tata McGraw Hill.New Delhi, 1980.

	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	1	2	1	1	2	1	1	1	2	2
Total	09	08	05	05	10	5	5	5	10	10
Course	03	02	01	01	2	1	1	1	2	2

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

YCABM2- CORPORATE PLANNING

Course Outcomes:

CO1 C Knowledge ***Describe*** various methods to define ***Corporate Planning and Budgeting***

CO2 C Understand ***Understand*** and apply set ***Social Responsibilities***

CO3 C Knowledge ***Describe*** and ***apply*** various ***Professionalism***

CO4 C Understand ***Describe*** and ***solve*** problems in ***Mission and Purpose***

CO5 C Understand ***Understand*** Concept of learning the ***Organisation Appraisal***

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCABM2	**Corporate Planning**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		3	**0**	**0**	**3**
UNIT- I: Corporate Planning and Budgeting					**09**
Significance of Planning: Types-Needs-Requisites-Corporate planning: system approach-Role of the planner-Corporate planning and budgeting.					
UNIT- II: Social Responsibilities					**09**
Social responsibilities: Scope, contents, cooperation and society, consumers, corporation and democracy, community-government.					
UNIT- III: Professionalism					**09**
Social responsibility-versus profitability-productivity-growth-Professionalism as a means of social bahaviour.					
UNIT- IV: Mission and Purpose					**09**

Mission and purpose: Business definitions - objectives and goals-Environment appraisal: Concepts, components-Scanning and appraising the environment.	
UNIT- V: Organisation Appraisal	**09**
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
Total	10	8	5	5	10	5	5	5	10	10
Course	2	2	1	1	2	1	1	1	2	2

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

YCABM3- FOUNDATIONS OF DECISION PROCESSES

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define role of decision making
CO2	C	Understand	***Understand*** and apply game theory and competitive strategies
CO3	C	Knowledge	***Describe*** and ***apply*** various queuing and inventory models
CO4	C	Understand	***Describe*** and ***solve*** problems in Finance.
CO5	C	Understand	***Understand*** Systematic problem analysis

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCABM3	**Foundations of Decision Processes**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		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
Total	10	8	5	5	10	5	5	5	10	10
Course	2	2	1	1	2	1	1	1	2	2

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

YCABM4- INVESTMENT TECHNOLOGY

Course Outcomes:

CO1 C Knowledge ***Describe*** various methods to define Source of ***investment information***

CO2 C Understand ***Understand*** and apply set ***Interest Rates***

CO3 C Knowledge ***Describe*** and ***apply*** various ***Shares and Valuation***

CO4 C Understand ***Describe*** and ***solve*** problems in ***Portfolio Theory***

CO5 C Understand ***Understand*** Concept of learning the ***Mutual Funds***

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCABM4	**Investment Technology**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		3	**0**	**0**	**3**

UNIT- I:Investment Information-Introduction	**9**
Source of investment information -Valuation of debt securities: Debt prices and interest rate risk-Default risk and purchasing power risk.	
UNIT- II:Interest Rates	**9**
Market interest rates - term structure of interest rates- Valuation of warrants-convertibles-Option pricing models.	
UNIT- III: Shares and Valuation	**9**

Valuation of equity shares: Dividends and valuation: MMS arguments, fundamental analysis-Earning multipliers-Timing of purchase -sale of equity shares-Estimating earnings and risk.	
UNIT- IV: Portfolio Theory	**9**
Portfolio theory- Efficient investments –diversification-Markowitz graphical portfolio analysis-Capital market theory- Portfolio performance evaluation- sharpe.	
UNIT- V: Mutual Funds	**9**
Treynor- Jenson measures- Mutual funds - kinds and evaluation-Behaviour of share prices - technical analysis-The efficient markets-Hypothesis - random walk and Martingale methods.	

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

TEXT

1. Clark N..et. al. "Financial Management: A Capital Market Approach". Helbrook, 1976

REFERENCES

2. Sharpe. W.F., "Investments". Prentice Hall of India. New Delhi. 1996.

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

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

YCABM5-BUSINESS FINANCE

Course Outcomes:

CO1	C	Knowledge	***Describe*** various methods to define financial and economic development
CO2	C	Understand	***Understand*** and apply primary and secondary capital market
CO3	C	Knowledge	***Describe*** and ***apply*** various managerial problems
CO4	C	Understand	***Describe*** and ***solve*** problems in non-banking financial institutions

CO5 C Understand ***Understand*** Credit rating information

COURSE CODE	COURSE NAME	L	T	P	C
YCABM5	**Business Finance**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0		**L**	**T**	**P**	**H**
		3	**0**	**0**	**3**

UNIT- I:Introduction to Business Finance	**9**
Financial and economic development- Intermediation, role and patterns- Functions of money and capital markets- Interest rates, determination, term structure.	
UNIT –II: Financial Intermediaries	**9**
Primary capital market: new issues, growth and trends- Financial intermediaries: merchant bankers- managers, brokers, underwriters-Secondary market - organization and functioning- Trading and settlement.	
UNIT – III: Managerial Problems	**9**
Problems relating to membership- commission- margins- arbitration and off-floor trading- Reforming the markets- SEBI- Market for government securities-the discount and finance house-Operation and managerial problems of commercial banks.	
UNIT- IV:Non-Banking Financial Institutions	**9**
Inter-bank call money market- Non-banking financial institutions: lending policies, schemes, composition and quantum of assistance of IDBI. IFCI. ICICI, UTI- L1C, GlC and state level financial corporations.	
UNIT- V: Credit Rating Information	**9**
Credit rating information: Parameters. Role- Agencies- CRISIL- Regulatory framework for financial markets and institutions: regulation versus deregulation- Role of RBI-Bank rate, open market operation policies.	

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

TEXT

1. Eddie MCLaney., "Business Finance Theory and practice ", 8th edition , Pearson Education ,2009.

REFERENCES

1. Copeland, T.E., et. al, "Financial Theory and Corporate Policy". Addison Wesley, Reading, MA. 1988.
2. Uppal.J.S., "Public Financial Institutions in India", Mac Millan, New York, 1984.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	2	2	2	1	1	1	2	2
CO 2	3	1	2	2	2	1	1	1	2	2
CO 3	2	2	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	3	2	2	2	2	1	1	1	2	2
Total	13	08	10	10	10	5	5	5	10	10
Course	3	02	2	2	2	1	1	1	2	2

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

YCABM6 TAXATION PRACTICES

Course Outcomes:

CO1 C Knowledge ***Characterize*** various scheme of taxation

CO2 C Understand ***Discuss*** *the various types of assessment*

CO3 C Knowledge ***Describe*** *the modes of recovery*

CO4 C knowledge ***Describe*** and apply the wealth and health tax

CO5 C Understand ***Understand*** the issues state sales tax

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCABM6	Taxation Practices	3	0	0	**3**
C:P:A =3:0:0					
		L	**T**	**P**	**H**
		3	0	0	3

UNIT- I: Assessment of undivided families **9**

Assessment of undivided families: Meaning-Basic conditions- Taxable income- Partitions- Tax planning- Assessment of firms and associations: Scheme of taxation- types- treatment of losses- Tax planning.

UNIT- II: Assessment of companies **9**

Assessment of companies: Types-profits-depreciation-tax planning-Section 80- Bonus issues-dividend policy-Return of income and assessment procedure: Types of assessment-Time limits-Reassessment-Cooperatives.

UNIT – III: Collection and recovery of tax **9**

Collection and recovery of tax: Deduction at source-rates-advance payment-Modes of recovery-Refund-Appeals and revision-Penalties.

UNIT- IV: Wealth Tax **9**

Wealth Tax: Chargeability-valuation-return-appeals-revisions-payment and recovery, gift tax:

chargeability-rebate-assessment-appeals-revisions-payment and recovery.

UNIT- V: Central sales tax **9**

Central sales tax: Concept of sale and purchase-Inter-state trade-Inter-state export and import trade. State sale tax: Assessing authority-Single-multiple point tax-Procedure for registration and cancellation-Returns-payment-appeals and revisions.

LECTURE	TUTORIAL	TOTAL
45	0	45

TEXT

1. " Girish Ahuja & Ravi Gupta ",Systematic Approach to Income Tax, Bharat Law House Pvt. Ltd, New Delhi.
2. " Vinod K. Sinhania & Monica Sinhania", Income Tax, Taxmann Publications Pvt. Ltd, New Delhi.
3. " Mehtrotra & Goyal" ,Taxation Law & Practice, Sahitya Bhavan Publication, Agra.
4. "Lal B.B" , Direct Taxes, Konark Publishing House, New Delhi.
5. " VS.Datey", Indirect Taxes law and practice Taxman allied services pvt. Ltd.Books in India"

REFERENCES

1. Central and State tax acts,Singhania, VK.,"**Taxman Direct Taxes**", Taxman, New Delhi. 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	1	1
CO 2	2	1	1	1	1	1	1	1	1	1
CO 3	2	2	1	1	1	1	1	1	1	1
CO 4	2	2	1	1	1	1	1	1	1	1
CO 5	1	2	1	1	1	1	1	1	1	1
Total	09	08	05	05	05	05	05	05	05	05
Course	03	02	01	01	01	01	01	01	01	01

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

YCABM7 MIS FRAMEWORKS AND IMPLEMENTATION

Course Outcomes:

CO1	C	Knowledge	***Describe*** variety of framework for identifying information technology
CO2	C	Understand	***Discuss*** the benefits of IT
CO3	C	Knowledge	***Describe*** the new strategic role of information system
CO4	C	knowledge	***Describe*** the business process reengineering
CO5	C	Understand	***Discuss*** the managing IT function

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCABM7	MIS Frameworks and Implementation	3	0	0	3
C:P:A =3:0:0					
		L	**T**	**P**	**H**
		3	0	0	3

UNIT- I: Introduction to MIS	**9**
This course will discuss a variety of frameworks for identifying information technology applications- The scope of IT applications would cover Management Information System- Decision Support System- Executive Information System and Expert System.	
UNIT- II: Managing Data Resource	**9**
Provide a broad understanding of the types of the benefits information technology applications can provide in an organization through transaction processing- management and operational control-decision support systems- office automation-organizational communications and group work support.	
UNIT- III: IT Strategy	**9**
Socio-economic environment and information systems in organization and the impact of information systems on organizations markets- frameworks for information systems planning- information systems and competitive advantage-the new strategic role of information systems: methodologies for evaluating investments in IT-frameworks and methodologies- should be discussed and illustrated with case studies.	
UNIT -IV : Business Process Integration with IT	**9**
Design of reporting system including a discussion of principles in indicator design- managing information support activity in organization- concept of the business process re-engineering (BPR) and how IT can enable BPR	
UNIT- V: Managing IT function	**9**
Critical success factor in implementing IT applications including the need for managing the process of change illustrated through case studies of successful/failed IT projects-Critical role of security in implementing IT applications should be discussed.	

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT

1. Kenneth C.Laudon.Jane P.Laudon, "Management information systems", Pearson, 14th edition.

REFERENCES

1. David olson, "Information system project manangement",2015.
2. Paige baltzan, Amy phillips ,"Business - Driven Information System",2015.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

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

YCABM8- MANAGEMENT OF SOFTWARE PROJECTS

Course Outcomes:

CO1 C Knowledge ***Describe*** various methods to define Software projects

CO2 C Understand ***Understand*** and apply project scheduling and project management.

CO3 C Knowledge ***Describe*** and ***design*** system life cycle

CO4 C Understand ***Describe*** and ***solve*** problems related to the project

CO5 C Understand ***Understand*** and determine skill requirements

Course Code	**Course Name**	**L**	**T**	**P**	**C**
YCABM8	Management of Software Projects	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		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	3	3	2	2	2	1	2	2	3	3
CO 2	2	2	2	2	2	1	2	2	3	3
CO 3	2	1	2	2	2	1	2	2	3	3
CO 4	2	2	2	2	2	1	2	2	2	2

CO 5	2	1	2	2	2	1	2	2	2	2
Total	11	09	10	10	10	5	10	10	13	13
Course	03	02	2	2	2	1	1	1	3	3

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

YCABM9 BLOCKCHAIN TECHNOLOGY

Course Outcomes:

CO1 C Knowledge ***Describe*** distributed database

CO2 C Understand ***Understand*** block chain network

CO3 C Understand ***Understand*** crypto currency and bit coin

CO4 C Understand ***Understand*** crypto currency regulation

CO5 C Apply ***Apply*** block chain applications

COURSE CODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCABM9	**BLOCKCHAIN TECHNOLOGY**	**3**	**0**	**0**	**3**
C:P:A = 3:0:0					
		L	**T**	**P**	**H**
		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: CRYPTOCURRENCYREGULATION 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	PSO 1	PSO 2
CO 1	3	1	2	2	2	1	1	1	2	2
CO 2	3	1	2	2	2	1	1	1	2	2
CO 3	2	1	2	2	2	1	1	1	2	2
CO 4	2	1	2	2	2	1	1	1	2	2
CO 5	3	2	2	2	2	1	1	1	2	2
Total	13	6	10	10	10	5	5	5	10	10
Course	3	2	2	2	2	1	1	1	2	2

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

4. Curriculum and Syllabus of the MCA programme – After Revision

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	0	2	2
	Total	**18**	**02**	**8**	**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 Visualization Laboratory	0	0	2	2	2
	Total	**12**	**2**	**10**	**25**	**21**

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 Project	0	0	3	3	3
YCA306	Industrial Lecturer	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	**12**	**0**	**13**	**25**	**21**

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 guidelinesfor relation schemas, Functional Dependencies. Normal forms based on primary keys (INF, 2NF,3NF& BCNF). Lossless join & Dependency preserving decomposition. Multivalueddependencies, 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.

	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

REFERENCES

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

YCA102 CRYPTOGRAPHY AND NETWORK SECURITY

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 IIALGORITHMS	**9**
Simplified DES- Key Management, Diffe-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.	
UNIT IIIPLANNING 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 IVFIREWALLS 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	PRACTICAL	TOTAL
45	0	0	45

TEXT

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

REFERENCES

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

E REFERENCES

3. https://onlinecourses.nptel.ac.in/noc15_cs03
4. 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

YCA103 PYTHON PROGRAMMING

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	PRACTICAL	TOTAL
	45	15	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	**15**
Basic Statistics: Measures of central tendencies - Measures of dispersion - Frequency distributions - Moments - Correlation coefficient - Regression.	
UNIT- II: Sampling statistical computing	**15**
Sampling: Theory of sampling - population and sample - Survey methods and estimation Statistical inference - Testing of hypothesis and inference	
UNIT- III: Statistics For Business	**15**
Computing frequency charts - Regression analysis.	
UNIT- IV: Data Analysis	**15**
Time series and forecasting	
UNIT- V:Implementation	**15**
Implementation: Using a programming language - a database system - Programming styles - reusability - extensibility - robustness - Programming-in-the-large - case study.	

	LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
	60	**15**	**0**	**75**

TEXT

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

REFERENCES

2. 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.

	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

YCA105 SOFTWARE ENGINEERING

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*** theS/W reuse and analytics process and service oriented s/w engineering concepts	Cognitive	K2 - K3
CO6	***Understand*** and ***Apply*** thesystems 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**	**PRACTICAL**	**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**	**PRACTICAL**	**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**	**PRACTICAL**	**TOTAL**
	30	**0**	**0**	**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 ofHive 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	PRACTICAL	TOTAL
45	15	0	60

TEXT

1. Michael Minelli, Michelle Chambers, Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley, 2013

REFERENCES

6. Venkat Ankam , Big Data Analytics , Released September 2016 ,Publisher(s): Packt Publishing
   ISBN: 9781785884696

E REFERENCES

3. https://nptel.ac.in/courses/106104189

	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

YCA203 ADVANCED DATA STRUCTURES

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 sortingalgorithms

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	PRACTICAL	TOTAL
	45	15	0	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	PRACTICAL	TOTAL
45	0	0	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**
	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

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
	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

YCA208 DATA VISUALIZATION 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 VISUALIZATION 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
	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

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	PRACTICAL	TOTAL
45	0	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 LECTURER

COURSECODE	**COURSE NAME**	**L**	**T**	**P**	**C**
YCA306	**INDUSTRIAL LECTURER**	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	State 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:

CO 1 C Applying ***Implement*** Graphics functions

CO 2 C Applying ***Build*** an application program using Line Drawing algorithms

CO 3 C Applying ***Develop*** an application using Circle Drawing algorithms

CO 4 C Applying ***Implement*** the 2D and 3D transformations

CO 5 C Applying ***Apply***the Key frame animation

CO 6 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	0	3
C:P:A = 3:0:0		**L**	**T**	**P**	**H**
PREREQUISITE	Basic Computer Skills	3*(SS)	0	0	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	PRACTICAL	TOTAL
	45	0	0	45

TEXT BOOKS

1. HamdyA.TAHA.,"Operations research- An Introduction", 8th edition, 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

COURSECODE			COURSENAME	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)	
UNITIII	**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	PRACTICAL	TOTAL
	45	0	0	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**
Multi-step methods - Milne's and Adams-Bash forth predictor-corrector methods for solving first order equations.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	0	0	45

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-Bayes 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	PRACTICAL	TOTAL
	45	0	0	45

TEXT

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

REFERENCES

3. Ronald A. Howard, Ali E. Abbas, "*Foundations of Decision Analysis*".Pearson,. 2016.
4. 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	***UnderstandSocial 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**	**PRACTICAL**	**TOTAL**
45	**0**	**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	PRACTICAL	TOTAL
	45	0	0	45

TEXT

3. Gilb, T., "Principles of Software Engineering Management", Addison Weskey. Reading. M.A. 1988.
4. Putnam. L.H . Myers. W., "Industrial Sire"'" Software - Effective Management using Measurement". IEEE C.S. Press. 1997.

REFERENCES

4. Dr.Jeroen Arnoldus, Dr.Sieuwert Van Otterloo, Dr.Joost Schalken-Pinkster, "Software Project Management", ICT Institute
5. Lean Agile and Kanban , " Software Engineering Management", on Pawel Brodzinski
6. “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	PRACTICAL	TOTAL
45	0	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	PRACTICAL	TOTAL
	45	0	0	45

TEXT

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

REFERENCES

4. Syed A.Ahson, Mohammad Ilyas, Cloud Computing and Software Services-Theory and Techniques, CRC, 2011.
5. Anthony T. Velte Toby J. Velte, Ph.D. Robert Elsenpeter, Cloud Computing-A Practical Approach, The McGraw-Hill, 2010
6. 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	**BLOCK CHAIN**	**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: CRYPTOCURRENCYREGULATION 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**	**PRACTICAL**	**TOTAL**
45	**0**	**0**	**45**

TEXT

3. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
4. Blockchain for Beginners: The Complete Step by Step Guide to Understanding Blockchain Technology by Mark Watney

Reference

3. Cryptocurrencies and Blockchains by Quinn DuPont
4. 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 DIGITALIMAGE 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**	**PRACTICAL**	**TOTAL**
	45	**0**	**0**	**45**

TEXT

2. Mark Nixon, et.a l, “Feature Extraction & Image processing for Computer vision” 3 rd Edition, 2012.

REFERENCES

2. 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

YCACE3DNATURAL 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**
YCACE3D	**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**	**PRACTICAL**	**TOTAL**
	45	**0**	**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 LEARNING

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 LEARNING**	**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	PRACTICAL	TOTAL
45	0	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	PRACTICAL	TOTAL
	45	0	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

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

YCACE4D PREDICTIVE ANALYTICS

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	PRACTICAL	TOTAL
	45	0	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