माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA
Deemed University
(Declared under Distinct Category by Ministry of Education, Government of India)
NAAC ACCREDITED WITH A++ GRADE

Dated 5/0
11/02/2025

BOARD OF STUDIES (BoS) PROCEEDING IN CENTRE FOR COMPUTER SCIENCE AND BUSINESS MANAGEMENT

(Meeting Dated – 8th December, 2024)

Centre for Computer Science and Business Management

Date: 08/12/2024

Minutes of Meeting of Board of Studies (BoS)

The Meeting of Board of Studies (BoS) in the Centre for Computer Science and Business Management (CSBM) at Madhav Institute of Technology & Science-Deemed University (MITS-DU), Gwalior, was held on 8th December 2024 at 01:00 P.M. onwards in offline / online mode (through video conferencing). During the meeting, following were present.

1.	Dr. Akhilesh Tiwari, *Professor & Head,* *Centre for CSBM, MITS-DU.*	Chairman
2.	Dr. Ritu Tiwari, *Professor & Head,* *Department of Artificial Intelligence, SVNIT, Surat.*	External Member
3.	Dr. Saurabh Chandra, *Professor,* *Indian Institute of Management (IIM), Indore.*	External Member
4.	Dr. Saumil Maheshwari, *Assistant Professor,* *Centre for CSBM, MITS-DU.*	Member
5.	Dr. Trilok Pratap Singh, *Assistant Professor,* *Centre for CSBM, MITS-DU.*	Member
6.	Dr. Monica Chauhan Bhadoriya, *Assistant Professor,* *Centre for CSBM, MITS-DU.*	Member
7.	Dr. Abhishek Dixit, *Assistant Professor,* *Centre for CSBM, MITS-DU.*	Member
8.	Dr. Devanshu Tiwari, *Assistant Professor,* *Centre for CSBM, MITS-DU.*	Member

The following external member could not attend the meeting.

1.	Dr. Naval Bajpai, *Professor,* *Department of Management Studies, ABV-IIITM, Gwalior.*	External Member
2.	Dr. Poornima Tapas, *Professor,* *Symbiosis Institute of Business Management Pune (SIBM), Pune.*	External Member

The following deliberation took place in the meeting:

ITEM CSBM-1:	To confirm the minutes of previous BoS meeting held in the month of September 2024. **The minutes of previous Board of Studies (BoS) meeting held on 12th September 2024 were presented, discussed and confirmed.**
ITEM CSBM-2:	To review the scheme structure of B. Tech Programme (Computer Science and Business Systems) for the Batch admitted in 2024-25 academic session. **The scheme structure of B. Tech Computer Science and Business Systems (CSBS) for the Batch admitted in 2024-25 academic session were discussed and recommended. *The same is enclosed as Annexure –I.***
ITEM CSBM-3:	To review & finalize the syllabi for all courses of B. Tech II Semester (for batch admitted in 2024-25) along with their COs.

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	The syllabi for all courses (along with their COs) which are to be offered during II Semester of B. Tech Computer Science and Business Systems (for batch admitted in 2024-25) were discussed, finalized and recommended. ***The same is enclosed as Annexure –II.***
ITEM CSBM-4:	To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses and Micro Project-II to be offered in B.Tech. (for batch admitted in 2024-25). **The list of experiment for the laboratory courses and Micro Project-II for II semester of B. Tech Computer Science and Business Systems (for batch admitted in 2024-25) along with their COs were discussed, finalized and recommended.** ***The same is enclosed as Annexure –III.***
ITEM CSBM-5:	To review and finalize the syllabi of II semester PG Programme (Master of Business Administration) (for batch admitted in 2024-25) along with their Course Outcomes (COs) **The syllabi (along with their Course Outcomes (COs)) of II semester for the Batch admitted in 2024-25 academic session, were discussed and recommended.** ***The same is enclosed as Annexure –IV.***
ITEM CSBM-6:	To review and finalize the contents of module under Classified Novel Engaging Course - to be offered in II semester of PG programme (MBA) (for batch admitted in 2024-25). **The module contents of Classified Novel Engaging Course (CNEC) titled "Essentials of Innovative Tools & Services", to be offered in II semester of MBA programme were reviewed, finalized and recommended.** ***The same is enclosed as Annexure –V.***
ITEM CSBM-7:	**Any other matter:** • To ratify the syllabi of all courses of Ph.D courses work offered during July-Dec 2024. **The syllabi of Ph.D Programme (course work) for the Batch admitted in 2024-25 academic session were presented and discussed.** ***The same is enclosed as Annexure –VI.*** • To review and finalize the content of the courses identified for MITS-MOOC development to be offered for B. Tech VII Semester DE/OC courses **The content of the courses for MITS-MOOC development to be offered for B. Tech VII Semester under DE/OC courses were reviewed, finalized and recommended.** ***The same is enclosed as Annexure –VII.***

Suggestions by External Experts/Members.

- *It was suggested to modify the contents of the course Data Science using Python to be offered in the II semester of MBA programme.*

The meeting ended with the vote of thanks to all the members.

Dr. Devanshu Tiwari

Dr. Abhishek Dixit

Dr. Monica Chauhan Bhadoriya

Dr. Trilok Pratap Singh

Dr. Saumil Maheshwari

Absent

Dr. Poornima Tapas, *Professor,*
Symbiosis Institute of Business Management Pune (SIBM), Pune

online present

Dr. Saurabh Chandra, *Professor,*
Indian Institute of Management (IIM), Indore

online present

Dr. Ritu Tiwari,
Professor & Head,
Department of Artificial Intelligence,
SVNIT, Surat.

Absent

Dr. Naval Bajpai, *Professor,*
Department of Management Studies, ABV-IIITM, Gwalior.

08.12.24

Dr. Akhilesh Tiwari,
Professor & Head,
Centre for Computer Science and Business Management, MITS-DU, Gwalior.
[Chairman, BoS]

11/02/2025
Dean
Faculty of Engineering & Technology
MITS-DU

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ANNEXURE - I

Scheme Structure of B. Tech Programme Computer Science and Business Systems for Batch Admitted in 2024-25 Under Flexible Curriculum

[ITEM CSBM: 2]

Recommended in the Board of Studies Meeting of Centre for CSBM held on 08th December 2024

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Semester-Wise General Scheme Structure & Important Guidelines for Flexible Curriculum

(Batch admitted in Academic Session 2024-25 onwards)

Abbreviations Used

L	Lecture
T	Tutorial
P	Practical
HSMC	Humanities and Social Sciences including Management Courses
BSC	Basic Science Courses
ESC	Engineering Science Courses
DC	Departmental Core
DE	Departmental Elective
SPC	Specialization Courses
OC	Open Category
DLC	Departmental Laboratory Courses
MOOC	Massive Open Online Course
MWS	Mandatory Workshop
SP	Semester Proficiency
SIP	Skill Internship Program
SLP	Self-learning Presentation
PDC	Professional Development Component
PBL	Project Based Learning
PC	Professional Certification
MAC	Mandatory Audit Course
NEC	Novel Engaging Course
SEP	Skill Enhancement Program

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Scheme of Evaluation

B. Tech. I Semester *(Computer Science and Business Systems)* *(for batch admitted in academic session 2024-25)*

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted: Theory Block: Continuous Evaluation: Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Practical Block: Continuous Evaluation: Lab Work & Sessional	Major Evaluation	Total Marks	Contact Hours per week: L	T	P	Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
1.	3024I101	DC	Introduction to Computer Science and Business Systems	20	20	30	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs.
2.	3024I102	ESC	Computer Programming	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs.
3.	3024I103	DC	Digital Logic Design	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs.
4.	3024I104	DC	**Business Communication**	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs.
5.	3024I105	BSC	Matrices and Calculus	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs.
6.	3024I106	DLC	Compuer Programming Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	3024I107	DLC	Business Communication Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	3024I108	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	3024I109	PBL	Micro Project-I*	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	3024I110	HSMC	Language Lab	-	-	-	-	70	30	100	-	-	3	1	Blended	AO	-
11.	NEC XXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	-	1	1	Interactive	SO	-
Total				100	100	150	150	380	120	1000	12	03	10	20	-	-	-
12.	30241111	MAC	Universal Human Values & Professional Ethics, (UHVPE)	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs.
13.	30241112	MWS	Mandatory Workshop on Indian Constitution and Traditional Knowledge at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

Skill Internship Program (Soft Skill): Minimum 45 hours duration: To be Credited in II Semester.

[$]Semester Proficiency – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question **AQ**: Assignment + Oral **PP**: Pen Paper **SO**: Submission + Oral **OB**: Open Book

*Micro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	1	1	3	0	0	0	2	1	1	0	0	0	1	1	1

Mode of Learning: Theory: Face to Face	Theory: Online	NEC: Interactive	Lab: Face to Face	Lab: Blended	Lab: Experiential	Lab: Experimental
14	00	01	01	01	02	01
70%	-	5%	5%	5%	10%	5%

Mode of Examination: Theory: PP	Theory: MCQ	Theory: OB	NEC: SO	Lab: AO	Lab: SO	Total Credits
06	08	00	01	03	02	20
30%	40%	-	5%	15%	10%	Credits %

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Scheme of Evaluation

B. Tech. II Semester *(Computer Science and Business Systems)* *(for batch admitted in academic session 2024-25)*

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted: Theory Block – Continuous Evaluation: Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Theory Block: Major Evaluation	Practical Block: Continuous Evaluation: Lab Work & Sessional	Practical Block: Major Evaluation	Total Marks	Contact Hours per week: L	T	P	Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
1.	30241201	DC	Data Structures	20	20	30	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs.
2.	30241202	DC	Object Oriented Programming	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs.
3.	30241203	DC	Discrete Structures	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs.
4.	30241204	BSC	Probability and Random Processes	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs.
5.	30241205	ESC	Basic Electrical & Electronics Engineering	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs.
6.	30241206	DLC	Data Structures Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	30241207	DLC	Object Oriented Programming Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	30241208	DLC	Electrical & Electronics Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
9.	30241209	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	30241210	PBL	Micro Project-II[*]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	NECXXXXX	NEC	Solved Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
12.	SIP1XXXX	SIP	Skill Internship Program (Soft-Skill)	-	-	-	-	60	-	60	-	-	-	2**	Experiential	SO	-
	Total			100	100	150	150	440	120	1060	13	02	10	22	-	-	-
13.	30241211	MAC	Sustainability & Environmental Science	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs.
14.	30241212	MWS	Mandatory Workshop on Indian Knowledge System at Department Level (Duration Two Days)											GRADE	Interactive	MCQ	-

Summer Semester of six-eight week duration will be conducted for makeup of I & II semester examination.

[$]Semester Proficiency – includes the weightage towards ability/ skill/ competency /knowledge-level /expertise-attained etc. in the semester courses

MCQ: Multiple Choice Question **AO**: Assignment + Oral **PP**: Pen Paper **SO**: Submission + Oral **OB**: Open Book

**These credits will be transferred from Skill Internship Program (Soft Skill).

[*]Micro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	1	1	3	0	0	0	3	1	1	1	0	0	1	1	1

Mode of Learning: Theory: Face to Face	Theory: Online	NEC: Interactive	Lab: Face to Face	Lab: Blended	Lab: Experiential	Lab: Experimental	Mode of Examination: Theory: PP	Theory: MCQ	Theory: OB	NEC: SO	Lab: AO	Lab: SO	Total Credits
14	00	01	01	00	03	03	06	08	00	01	03	04	32
63.64%	-	4.55%	4.55%	-	13.64%	13.64%	27.27%	36.36%	-	4.55%	13.64%	18.18%	Credits %

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Scheme of Evaluation

B. Tech. III Semester *(Computer Science and Business Systems)* *(for batch admitted in academic session 2024-25)*

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted: Theory Block: Continuous Evaluation: Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Practical Block: Continuous Evaluation: Lab Work & Sessional	Major Evaluation	Total Marks	Contact Hours per week: L	T	P	Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
1.	30242101	BSC	Statistics and Numerical Methods	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs.
2.	30242102	DC	Design and Analysis of Algorithms	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	30242103	DC	Computer Networks	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	30242104	DC	Computer Organization and Architecture	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs.
5.	30242105	DC	Fundamentals of Economics	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
6.	30242106	DLC	Design and Analysis of Algorithms Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	30242107	DLC	Numerical Computation using MATLAB	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	30242108	DLC	Problem Solving through Python Programming	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
9.	30242109	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	30242110	PBL	Macro Project-I[^]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	30242111	SLP	Self-learning Presentation[$$] (SWAYAM/NPTEL/MOOC)	-	-	-	-	40	-	40	-	-	2	1	Mentoring	SO	-
12.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	-	1	1	Interactive	SO	-
			Total	100	100	150	150	420	120	1040	12	04	12	22	-	-	-
13.	30242112	MAC	Cohort Sessions	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
14.	30242113	MWS	Mandatory Workshop on Internet of Things (IoT) at Department Level (Duration Two Days)											GRADE	Interactive	MCQ	

Skill Internship Program (Institute Level) (Qualifier): Minimum 30 hours duration: To be Credited in IV Semester

[$]Semester Proficiency – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral **OB:** Open Book

[^]Macro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

[$$]Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance and presentation.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	1	0	4	0	0	0	3	1	1	0	1	0	1	1	1

Mode of Learning: Theory: Face to Face	Theory: Online	NEC: Interactive	Lab: Mentoring	Lab: Face to Face	Lab: Blended	Lab: Experiential	Lab: Experimental	Mode of Examination: Theory: PP	Theory: MCQ	Theory: OB	NEC: SO	Lab: AO	Lab: SO	Total Credits
15	00	01	01	01	00	01	03	06	09	00	01	03	03	22
68.18%	-	4.55%	4.55%	4.55%	-	4.55%	13.64%	27.27%	40.91%	-	4.55%	13.64%	13.64%	Credits %

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Scheme of Evaluation

B. Tech. IV Semester *(Computer Science and Business Systems)* *(for batch admitted in academic session 2024-25)*

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional									
1.	30242201	BSC	Linear Algebra and Optimization	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs.
2.	30242202	DC	Database Management System	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs.
3.	30242203	DC	Operating Systems	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs.
4.	30242204	DC	Financial Management	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs.
5.	30242205	DC	Data Science	20	20	30	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs.
6.	30242206	DLC	Data Science Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	30242207	DLC	Database Management System Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	30242208	DLC	Competitive Programming	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
9.	30242209	SP	Semester Proficiency*	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	302422I0	PBL	Macro Project-II**	-	-	-	-	70	30	100	-	-	2	1	Experimental	SO	-
11.	30242211	PC	Professional Certification	-	-	-	-	50	-	50	-	-	2	1	Blended	SO	-
12.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
13.	SIP3XXXX	SIP	Skill Internship Program	-	-	-	-	60	-	60	-	-	-	3***	Experiential	SO	-
	Total			**100**	**100**	**150**	**150**	**490**	**120**	**1110**	**13**	**03**	**12**	**24**	-	-	-
14.	30242212	MAC	Project Management, Economics & Financing	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
15.	30242213	MWS	Mandatory Workshop on Computer Vision at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
16.	30242214	MWS	Mandatory Workshop on Life Skills at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-

Summer Semester of six-eight week duration will be conducted for makeup of previous semester examination.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

*Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple-Choice Question · **AO:** Assignment + Oral · **PP:** Pen Paper · **SO:** Submission + Oral · **OB:** Open Book

**Macro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

***These credits will be transferred from Skill Internship Program.

PC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	1	0	4	0	0	0	3	1	1	1	0	0	1	1	3

Mode of Learning							Mode of Examination						Total Credits
Theory		NEC	Lab				Theory			NEC	Lab		
Face to Face	Online	Interactive	Face to Face	Blended	Experiential	Experimental	PP	MCQ	OB	SO	AO	SO	
15	00	01	01	01	03	03	06	09	00	01	03	05	24
62.50%	-	4.17%	4.17%	4.17%	12.50%	12.50%	25.00%	37.50%	-	4.17%	12.50%	20.83%	Credits %

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Scheme of Evaluation

B. Tech. V Semester *(Computer Science and Business Systems)* *(for batch admitted in academic session 2024-25)*

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	30243101	DC	Formal Language and Automata Theory	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	30243102	DC	Software Engineering	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	30243103	DC	Artificial Intelligence and Machine Learning	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	302431XX	DE	Departmental Elective[4] (DE-I)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
5.	302431XX	SPC	Specialization Course (SPC-I)[3]	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
6.	30243104	DLC	Software Engineering Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
7.	30243105	DLC	Artificial Intelligence and Machine Learning Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
8.	30243106	SP	Semester Proficiency[5]	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	30243107	PBL	Comerstone Project	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
Total				80	80	120	120	260	90	25	75	850	11	04	10	20	-	-	-
10.	30243108	MAC	Supply Chain Management	30	20	30	30	-	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	30243109	MWS	Mandatory Workshop on Blockchain at Department Level (Duration: Two Days)													GRADE	Interactive	MCQ	-

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

[5] Semester Proficiency – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question · **AO**: Assignment + Oral · **PP**: Pen Paper · **SO**: Submission + Oral · **OB**: Open Book

[4] Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	3	1	1	0	2	0	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory			Lab		
Face to Face	Online	Face to Face	Experiential	Experimental	PP	MCQ	OB	AO	SO	
12	03	01	02	02	03	12	00	02	03	20
60.00%	15.00%	5.00%	10.00%	10.00%	15.00%	60.00%	0.00%	10.00%	15.00%	Credits %

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Scheme of Evaluation

B. Tech. VI Semester *(Computer Science and Business Systems)* **(for batch admitted in academic session 2024-25)**

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	30243201	DC	Marketing Research & Marketing Management	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	30243202	DC	Compiler Design	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	302432XX	DE	Departmental Elective* (DE-2)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	2 Hrs
4.	302432XX	OC	Open Category Course (OC-1)#	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
5.	302432XX	SPC	Specialization Course (SPC-2)	20	20	30	30	-	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
6.	30243203	DLC	Compiler Design Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
7.	30243204	DLC	IoT Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
8.	30243205	SP	Semester Proficiency$	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	30243206	PBL	Capstone Project	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
			Total	80	80	120	120	260	90	25	75	850	12	03	10	20	-	-	-
10.	30243207	MAC	Disaster Management	20	20	30	30	-	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	30243208	MWS	Mandatory Workshop on Intellectual Property Rights at Department Level (Duration: Two Days)													GRADE	Interactive	MCQ	-

Skill Enhancement Program/Research Internship/On Job Training for Four weeks duration

Summer Semester of six-eight week duration will be conducted for makeup of Previous semester examination.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

$Semester Proficiency – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple-Choice Question · **AO:** Assignment + Oral · **PP:** Pen Paper · **SO:** Submission + Oral · **OB:** Open Book

#Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	2	1	1	1	2	0	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory			Lab		
Face to Face	Online	Face to Face	Experiential	Experimental	PP	MCQ	OB	AO	SO	
12	03	01	02	02	06	09	00	02	03	20
60.00%	15.00%	5.00%	10.00%	10.00%	30.00%	45.00%	-	10.00%	15.00%	Credits 20

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Scheme of Evaluation

B. Tech. VII Semester *(Computer Science and Business Systems)* (for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	302441XX	DE	Departmental Elective* (DE-3)	20	20	30	30	-	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
2.	302441XX	DE	Departmental Elective* (DE-4)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	2 Hrs
3.	302441XX	OC	Open Category Course* (OC-2)	-	-	-	-	-	-	25	75	100	2	1	-	3	Online	MCQ	2 Hrs
4.	302441XX	SPC	Specialization Course* (SPC-3)	20	20	30	30	-	-	-	-	100	2	1	-	3	Blended	MCQ	2 Hrs
5.	30244101	SEP	Skill Enhancement Program/Research Internship/ On Job Training	-	-	-	-	-	50	-	-	50	-	-	-	1**	Experiential	SO	-
6.	30244102	DLC	Creative Problem Solving	-	-	-	-	-	50	-	-	50	-	-	2	1	Experiential	SO	-
Total				40	40	60	60	-	100	50	150	500	10	02	02	14	-	-	-

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral **OB:** Open Book

*Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform.

**These credits will be transferred from Skill Enhancement Program/Research Internship/On Job Training

*Course run through MITS-DU MOOCs

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SEP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	2	1	1	1	0	1	0	0	0	0	0	0

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab			Theory			Lab		
Blended	Online	Face to Face	Experiential	Experimental	PP	MCQ	OB	AO	SO	
06	06	00	02	00	06	06	00	00	02	14
42.86%	42.86%	-	14.28%	-	42.86%	42.86%	-	-	14.28%	Credits %

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Centre for Computer Science and Business Management

Scheme of Evaluation

B. Tech. VIII Semester *(Computer Science and Business Systems)* **(for batch admitted in academic session 2024-25)**

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation															
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
1.	302442XX	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
2.	302442XX	OC	Open Category Course* (OC-3)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
3.	30244201	PBL	Industry Internship/ Research Internship/ Incubation & Start-up	-	-	-	-	280	120	-	-	400	-	-	20	10	Experiential	SO	-
4.	30244202	PDC	Professional Development**	-	-	-	-	-	50	-	-	50	-	-	4	2	Interactive	SO	-
Total				-	-	-	-	280	170	50	150	650	06	-	24	18	-	-	-

Summer Semester of six-eight week duration will be conducted to complete any backlog courses.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral OB: Open Book

*Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

** Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG programme (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs, technical events, institute/department committees, etc.).

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab		PDC	Theory			Lab		
Face to Face	Online	Face to Face	Experiential	Interactive	PP	MCQ	OB	AO	SO	
00	06	00	10	02	00	06	00	00	12	18
-	33.33%	-	55.56%	11.11%	-	33.33%	-	-	66.67%	Credits %

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ANNEXURE - II

Syllabi of
Courses
B. Tech II Semester
(Computer Science and Business Systems)
(Batch Admitted in 2024-25)
Under Flexible Curriculum
[ITEM CSBM: 3]

Recommended in the Board of Studies Meeting of Centre for CSBM held on 08th December 2024

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DATA STRUCTURES
30241201

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit I:

Introduction to Data Structures: Algorithms & their Characteristics, Asymptotic Notations, Arrays and its Representations, Index to Address Translation, **Link List:** Introduction, Implementation of Linked List, Operations, Circular Link List, Doubly Linked List, Polynomial Manipulation using Linked List.

Unit II:

Stacks: Concepts and Implementation of Stacks, Operations on Stack, Conversion of Infix to Postfix Notation, Evaluation of Postfix Expression, Recursion.

Queues: Concepts and Implementation, Operations on Queues, Dequeue, Priority Queues, Circular Queues and Application.

Unit III:

Trees: Types, Terminology, Binary Tree -Representations, Traversal, Conversion of General Tree to Binary Tree, Binary Search Tree, Threaded Binary Tree and Height Balanced Tree.

Unit IV:

Graphs: Background, Graph Theory Terminologies, Representation of Graphs- Sequential & Linked Representation, Path Matrix, Graph Traversals- BFS, DFS, Spanning Trees, Applications of Graph.

Unit V:

Searching & Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort and Heap Sort, Comparison Between Sorting Techniques, Hashing and Collision Resolution Techniques.

RECOMMENDED BOOKS

1. Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
2. An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
3. Data Structures & Algorithms, Aho, Hopcroft & Ullman, Original Edition, Pearson Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the concept of algorithms, linked list data structures.

CO2. apply the appropriate data structure stack and queue to solve problems.

CO3. discuss the concept of tree data structure, various types & their applications.

CO4. demonstrate the representation and traversal techniques of graphs and their applications.

CO5. design various searching and sorting algorithms and analyze their performance.

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

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OBJECT ORIENTED PROGRAMMING
30241202

COURSE OBJECTIVES

- To study about the concept of object-oriented programming.
- To create C++ programs that leverage the object-oriented features.
- To apply object-oriented techniques to solve real world problems.

Unit I:

Object Oriented Paradigm, Features of OOPs: Encapsulation, Class and Object, Inheritance, Reusability, Polymorphism, Abstraction etc, Comparison with Procedural Oriented Programming & Object-Oriented Programming, Function Overloading, Default Augments, References, Inline Functions.

Unit II:

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Friend Function and Class, Member Function, Member Initializer List, Constructors and Destructors, Deference between Class and Structure.

Unit III:

Dynamic Allocations: New, Delete, Malloc and Free, Dynamic Allocation of Objects, Array of Objects, Mutable Data Members, Self-Referential Class, Shallow and Deep Copying, This Pointer, Proxy Classes.

Operator Overloading: Overloading Unary and Binary Operators, **Type Casting:** Implicit, Explicit, Dynamic, Static, Reinterpret, Conversion Between Objects of Various Classes.

Unit IV:

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance, Ambiguity in Inheritance, Virtual Base Classes, Constructors in Derived Classes. **Polymorphism:** Dynamic and Static Binding, Pure Virtual Function, Abstract and Concrete Classes, Virtual Destructors, Containership: Nesting of Classes.

Unit V:

Exception Handling: Try, Catch and Throw, Streams and File: Basic Concept and Class Hierarchy, Templates: Function Template, Class Template, Template Specialization, Default Type Arguments and Templates, Namespaces and their uses.

RECOMMENDED BOOKS

1. C++ How to Program: H M Deitel and P J Deitel, Prentice Hall,1998.
2. Object Oriented Programming in Turbo C++: Robert Lafore, The WAITE Group Press, 1994.
3. Programming with C++: D Ravichandran, T.M.H, 2003.
4. Object oriented Programming with C++: E Balagurusamy, Tata McGraw-Hill, 2001.
5. The Complete Reference in C++: Herbert Schildt, TMH, 2002.
6. Object Oriented Analysis & Design: G. Booch, Addison Wesley, 2006.
7. Principles of Object-Oriented Analysis and Design: James Martin, Prentice Hall, 1992.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. analyze object-oriented paradigms, features like encapsulation, inheritance, polymorphism, and compare OOP with procedural programming.

CO2. apply knowledge of classes and objects to create programs with member functions, static members, constructors, and destructors.

CO3. implement dynamic memory allocation, shallow and deep copying, operator overloading, and type casting in programs.

CO4. evaluate different types of inheritance and polymorphism, and design programs with abstract classes and virtual functions.

CO5. create robust programs using exception handling, streams, templates, and namespaces for modular and reusable code.

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

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DISCRETE STRUCTURES
30241203

COURSE OBJECTIVES

- To gain knowledge of basic algebra and discrete numeric function.
- To learn functions and its relation.
- To familiarize with propositional logic.
- To know about the graph theory and its application in computer.
- To be familiar with generating function.

Unit I:

Functions and Relations: Sets, Subsets, Power Sets, Complement, Union and Intersection, Demorgan's Law Cartesian Products, Relations, Relational Matrices, Properties of Relations, Equivalence Relation, Functions, Injection, Surjection and Bijective Mapping, Composition of Functions, Permutations, Characteristic Functions and Mathematical Induction.

Unit II:

Partial Order Relations and Lattice: Partial Order Set, Hasse Diagrams, Upper Bounds, Lower Bounds, Maximal and Minimal Element, First and Last Element, Lattices, Sub-Lattices, Lattice Homomorphism, Lattice Isomorphism, Complete Lattice, Complemented Lattice, Distribution Lattice.

Unit III:

Group and Field: Group axioms, Abelian group, and its properties, Sub group, Co-sets, Left and Right Co-sets, Normal subgroup, semi group, Lagrange theorem, fields, minimal polynomials, reducible polynomials, primitive polynomial, polynomial roots, applications.

Unit IV:

Graph Theory: Finite Graphs, Incidence and Degree, Isomorphism, Sub Graphs and Union of Graphs, Connectedness, Walk, Paths and Circuits, Eulerian and Hamiltonian Graphs. Trees: Properties of Trees, Pendant Vertices in Tree, Center of Tree, Spanning

Trees and Cut Vertices, Binary Tree, Matrix Representation of Graph, Incidence and Adjacency Matrix and Properties, Applications of Graphs in Computer Science.

Unit V:

Discrete Numeric Functions: Introduction to Discrete Numeric Functions and Generating Functions, Introduction to Recurrence Relations and Recursive Algorithms, Linear Recurrence Relations with Constant Coefficients, Homogeneous Solutions, Particular Solutions and Total Solutions.

RECOMMENDED BOOKS

1. Discrete Mathematical Structures with Application to Computer science: J.P Tremblay and Manohar, McGraw-Hill, 1st Edition 2017.
2. Graph Theory: Nersingh Deo, PHI Learning, 2014.
3. Discrete Mathematics: C.L Liu, 4th Edition 2012.
4. Discrete Mathematics and its Applications: Rosen, McGraw Higher Ed, 7th Edition 2008.
5. Topics in Algebra: N. Herstein, Wiley, 2nd Edition 2006.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. acquire knowledge of set theory.

CO2. analyse the concept of Lattices.

CO3. apply the concept of Group Theory.

CO4. derive the Inferences from Graph theory.

CO5. illustrate the Discrete numeric function and recursive relation.

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

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PROBABILITY AND RANDOM PROCESSES
30241204

COURSE OBJECTIVES

- To learn central tendency, skewness and kurtosis.
- To describe probability theory and distribution.
- To familiarize with correlation and regression.
- To know about the hypothesis analysis.
- To explore the theory of attributes and rules of association.

Unit I:

Measure of Central Tendency: Measures of Averages and Standard Deviation, Moments About Origin and Mean, Moment Generating Function, Skewness and Kurtosis.

Unit II:

Probability & Regression: Definition of Probability: Classical and Axiomatic Approaches, Laws of Total and Compound Probability, Conditional Probability, Curve Fitting, Correlation and Regression.

Unit III:

Probability Distribution: Probability Distribution Function, Probability Density Function, Central Limit Theorem, Binomial Distribution, Poisson Distribution, Normal Distribution, Exponential Distribution, Uniform Distribution.

Unit IV:

Testing of Hypothesis: Testing of Hypothesis, Chi-Squre Test, T-Test, F-Test, Z-Test, Analysis of Variance: One Way and Two-Way Classifications.

Unit V:

Random Variables & Processes: Concept of Random Variable, One-Dimensional Random Variable, Two-Dimensional Random Variable, Distribution Function, Joint Probability Distribution Function, Marginal Probability Distribution, Cumulative Probability Distribution, Conditional Distribution Function.

RECOMMENDED BOOKS

1. Mathematical Statistics: M Ray and H.S. Sharma, Ram Prasad Publications, 3rd Edition 2017.
2. Statistical Methods: V. K. Kapoor, S.C. Gupta, S. Chand& Company, 11th Edition 2018.
3. Probability: T. Veerarajan, Statistics and Random Processes, McGraw Hill, 3rd Edition 2008.
4. Introduction to Probability Models: S. M. Rose, Elsevier, 10th Edition 2011.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. gain knowledge of measures of central tendency.

CO2. evaluate the skewness, kurtosis, curve fitting, correlation and regression.

CO3. interpret the theory of probability and its distributions.

CO4. examine the test of hypothesis.

CO5. compute random variables with random process.

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

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING
30241205

COURSE OBJECTIVES

- To impart basic knowledge of the DC and AC circuits and their applications.
- To familiarize the students with the basic knowledge of magnetic circuits, transformer, rotating electrical machine and its terminology.
- To make familiarize the students about the working of, various electronic circuits and its importance.

Unit I:

D.C. Circuits Analysis: Voltage and Current Sources, Dependent and Independent Source, Source Conversion, Kirchhoff's Law, Mesh and Nodal Analysis, Network Theorems: Superposition Theorem, Thevenin's Theorem & Norton's Theorem and Their Applications.

Unit II:

Single-Phase AC Circuits: Generation of Sinusoidal AC Voltage, Definitions: Average Value, R.M.S. Value, Form Factor and Peak Factor of AC Quantity, Concept of Phasor, Analysis of R-L, R-C, R-L-C Series and Parallel Circuit, Power and Importance of Power Factor.

Unit III:

Magnetic Circuits & Resonance: Magnetic Circuits: Concept of MMF, Flux and Magnetic Reluctance, Self and Mutual Inductances, Dot Convention, Coefficient of Coupling and Coupled Circuits. **Resonance:** Series and Parallel Resonance, Bandwidth, Q-Factor and Selectivity.

Unit IV:

Single-phase Transformer & Rotating Electrical Machines: Single Phase Transformer, Basic Concepts, Construction and Working Principal, Ideal Transformer and Its Phasor Diagram at No Load, Voltage, Current and Impedance Transformation, Equivalent Circuits and its Phasor Diagram, Voltage Regulation, Losses and Efficiency, Testing of Transformers, Construction & Working Principle of DC and AC Machine.

Unit V:

Digital Electronics, Devices & Circuits: Number Systems used in Digital Electronics, Decimal, Binary, Octal, Hexadecimal, their Complements, Operation and Conversion, Demorgan's Theorem, Logic Gates- Symbolic Representation and Their Truth Table, Introduction to Semiconductors, Diodes, V-I Characteristic, Bipolar Junction Transistors and Their Working, Introduction To CB, CE & CC Transistor Configurations.

RECOMMENDED BOOKS

1. Basic Electrical and Electronics Engineering, D. P. Kothari & I. J. Nagrath-Tata McGraw Hill.
2. Basic Electrical and Electronics Engineering, V N Mittle & Arvind Mittal -Tata McGraw Hill.
3. Basic Electrical and Electronics Engineering, S. K Bhattacharya -Pearson.
4. Electrical Machinery, A.E. Fitzgerald, C. Kingsley and Umans – TMH.
5. Principles of Electrical Engineering, Vincdent Del Toro- Prentice Hall.
6. Basic Electrical Engineering, A, E. Fitzgerald, Higginbotham and Grabel -TMH.
7. Integrated Electronics, Millmann & Halkias.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. solve dc & ac circuits by applying fundamental laws & theorems

CO2. analyze magnetic circuits and resonance characteristics of ac electric circuits

CO3. describe the working principle, construction, applications of single-phase transformer & rotating electrical machines

CO4. select the logic gates for various applications in digital electronic circuits.

CO5. explain the characteristics and parameters of Diode and Transistor.

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

SUSTAINABILITY & ENVIRONMENTAL SCIENCE
30241211

COURSE OBJECTIVES

- To equip students with a comprehensive understanding of environmental science, pollution control, sustainability, and global frameworks, enabling them to analyze environmental challenges and contribute to sustainable solutions through informed decision-making and responsible practices.

Unit I:

Introduction to Environmental Science: Definition, Importance and its Components. Ecosystem and its Components, Water Cycle, Carbon Cycle, Food Chain, Energy Flow in Ecosystem, Current State of Environment in India and World: Underlying Reasons (Root Causes) of Modern Environmental Degradation (Social, Psychological, Cultural).

Unit II:

Environmental Pollution and Management: Air, Water, Noise, Soil, Thermal and Radioactive, Causes, Impacts, Pollution Control Techniques and Mitigation Strategies, Solid Waste Management: Principles of Waste Management, Different Components of Waste Management System and Introduction to Management of Hazardous Waste Like E-Waste, Plastic Waste, Global Environmental Issues: Climate Change, Global Warming, Ozone Layer Depletion.

Unit III:

Environmental Policies and Laws in India: Environmental Protection Act, Water Act, Air Act, **Overview of Global Environmental Policies and Frameworks**: Kyoto Protocol, Montreal Protocol, COP Summits. Introduction to Clean Development Mechanism, Carbon Credit, Carbon Trading.

Unit IV:

Sustainability Concepts: Definition, Importance, Pillars of Sustainability (Economic, Environmental, and Social), Sustainable Development, Overview of UN Sustainable Development Goals (SDGS) And Their Global Relevance, Concept of Circular Economy, Resource Efficiency, Energy Conservation, Green Buildings and Sustainable Manufacturing.

Unit V:

Sustainable Energy Solutions: New Energy Sources: Need of New Sources, Different Types New Energy Sources, Applications of Hydrogen Energy, Ocean Energy Resources, Tidal Energy Conversion, Concept, Origin and Power Plants of Geothermal Energy, Introduction to Sustainable Transportation Systems and Sustainable Water Infrastructure.

RECOMMENDED BOOKS

1. A Text Book of Environmental Studies, D. K. Asthana, Meera Asthana, S Chand & Co., New Delhi.
2. Environmental Engineering & Management, S. K. Dhameja, S K Kataria & Sons, New Delhi
3. Environmental Pollution Control Engineering, C.S. Rao, New Age International Publishers
4. Environmental Sustainability and Green Technologies, A. K. Gupta, PHI Learning.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the fundamental concepts of environmental science, including ecosystems and the causes of environmental degradation.

CO2. analyze the sources, causes, and impacts of air, water, and solid waste pollution and propose appropriate mitigation strategies.

CO3. evaluate the effectiveness of environmental policies and global frameworks in addressing environmental challenges.

CO4. explain the concepts of sustainability and sustainable development goals.

CO5. apply various solutions for achieving sustainable development.

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

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ANNEXURE - III

List of Programs and List of Micro Project -II for Laboratory Courses B. Tech II Semester (Batch Admitted in 2024-25) (Computer Science and Business Systems) Under Flexible Curriculum

[ITEM CSBM: 4]

Recommended in the Board of Studies Meeting of Centre for CSBM held on 08th December 2024

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
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DATA STRUCTURES LAB
(30241206)

LIST OF PROGRAMS

1. Write a program to implement doubly linked list with all possible deletion operations.
2. Write a program to insert an element in the beginning of the circular linked list.
3. Write a program to implement stack using linked list.
4. Write a program to count the number of nodes in the binary search tree.
5. Write a program to implement AVL Tree.
6. Write a program to traverse the BST in pre-order and post-order.
7. Write a program to implement Graph using an array.
8. Write a program to implement Breadth First Search.
9. Write a program to implement Depth First Search.
10. Write a program to implement Spanning Tree.
11. Write a program to implement binary search algorithm.
12. Write a program to implement Heap Sort.
13. Write a program for implementing the Radix Sort methods to arrange a list of integers in ascending order.
14. Write a program for implementing the Quick Sort methods to arrange a list of integers in ascending order.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. implement data structures like arrays and linked lists to manage and manipulate data effectively.
CO2. develop stack and queue operations, including applications like expression evaluation and recursion.
CO3. construct and traverse various tree structures, including binary search trees and height-balanced trees.
CO4. apply graph traversal techniques like BFS and DFS for solving pathfinding and connectivity problems.
CO5. design efficient sorting and searching algorithms, and resolve hashing collisions.

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

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OBJECT ORIENTED PROGRAMMING LAB
(30241207)

LIST OF PROGRAMS

1. Write a program to demonstrate example of member initializer list.
2. Write a program to demonstrate example of default constructor or no argument constructor.
3. Write a program to demonstrate example of parameterized constructor.
4. Write a program to demonstrate example of copy constructor.
5. Write a program to demonstrate example of constructor overloading.
6. Write a program to demonstrate example of destructors.
7. Write a program to demonstrate example of constructor using this pointer.
8. Write a program to demonstrate example of constructor with default arguments.
9. Write a program to dynamic Initialization of Objects.
10. Write a program to set values of data members using default, parameterized and copy constructor
11. Write a program to demonstrate example of simple inheritance.
12. Write a program to demonstrate example of private simple inheritance.
13. Write a program to read and print student's information using two classes and simple inheritance.
14. Write a program to demonstrate example of multilevel inheritance.
15. Write a program to read and print employee information using multiple inheritance.
16. Write a program to demonstrate example of multiple inheritance.
17. Write a program to demonstrate example of hierarchical inheritance to get square and cube of a number.
18. Write a program to read and print employee information with department and PF information using hierarchical inheritance.
19. Write a program for unary minus (-) operator overloading.
20. Write a program for unary increment (++) and decrement (--) operator overloading.
21. Write a program for unary logical NOT operator overloading.
22. Write a program to add two objects using binary plus (+) operator overloading.
23. Write a program to add two distances using binary plus (+) operator overloading.
24. Write a program to create a simple class and object.
25. Write a program to create an object of a class and access class attributes.
26. Write a program to create multiple objects of a class.
27. Write a program to create class methods.
28. Write a program to define a class method outside the class definition.
29. Write a program to assign values to the private data members without using constructor.
30. Write a program to create an empty class (a class without data members and member functions).

31. Write a program to create a class with setter and getter methods.
32. Write a program to create a class to read and add two distances.
33. Write a program to create a class for student to get and print details of a student.
34. Write a program to create a class for student to get and print details of N students.
35. Write a program to demonstrate example of array of objects.
36. Write a program to create class to read and add two times.
37. Write a program to create class to read time in seconds and convert into time in (HH:MM:SS).
38. Write a program to create class to read time in HH:MM:SS format and display into seconds.
39. Write a program to demonstrate example of friend function with class.
40. Write a program to count the created objects using static member function.
41. Write a program to create an object of a class inside another class declaration.
42. Write a program to create a class Point having X and Y Axis with getter and setter functions.
43. Write a program for passing an object to a Non-Member function.
44. Write a program for accessing Member Function by pointer.
45. Write a program for accessing the address of an object using 'this' pointer.
46. Write a program to create a class with public data members only.
47. Write a program to input list of candidates and find winner of the Election based on received votes.
48. Write a program for Banking Management System using Class.
49. Write a program to create a file.
50. Write a program to read a text file.
51. Write a program to write and read text in/from file.
52. Write a program to write and read values using variables in/from file.
53. Write a program to write and read object using read and write function.
54. Write a program to demonstrate example of tellg() and tellp() function.
55. Write a program to write and read time in/from binary file using fstream.
56. Write a program to write and read an object in/from a binary file.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. apply the concepts of object-oriented programming, including constructors, destructors, and initializer lists.

CO2. apply inheritance and operator overloading to solve real-world problems using C++ programming.

CO3. analyze file handling techniques, including reading and writing data and objects in text and binary formats.

CO4. evaluate different approaches for dynamic object creation and memory management in C++ using pointers and references.

CO5. create modular C++ programs using classes, access specifiers, friend functions, and static members for practical applications.

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

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ELECTRICAL & ELECTRONICS ENGINEERING LAB (30241208)

LIST OF EXPERIMENTS

1. To verify Kirchhoff's Current Law & Kirchhoff's Voltage Law.
2. To verify Superposition Theorem
3. To determine resistance & inductance of a choke coil.
4. To determine active & reactive power in a single-phase A.C circuit.
5. To determine voltage ratio & current ratio of a single-phase transformer.
6. To determine the polarity of a single-phase transformer.
7. To perform open circuit & short circuit test on a single-phase transformer.
8. To study multimeter & measure various electrical quantities
9. To study of constructional details of DC machine.
10. To determine the V-I characteristics of diode in forward bias & reverse bias condition.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. demonstrate the ability to operate lab equipment and instruments relevant to the electrical engineering field.
CO2. collect experimental data accurately and effectively.
CO3. integrate theoretical knowledge from coursework into practical applications and experiments.
CO4. communicate experimental results effectively through oral presentations and written documentation.
CO5. demonstrate responsibility and professionalism in the completion of lab tasks and assignments.
CO6. show willingness to learn new techniques, tools, or methods to enhance practical engineering skills.

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

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List of
Micro Project - II
B. Tech II Semester
(Batch Admitted in 2024-25)
(Computer Science and Business Systems)
Under Flexible Curriculum

Recommended in the Board of Studies Meeting of Centre for CSBM held on 08th December 2024

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
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LIST OF MICRO PROJECT-II
30241210

1. Library Book Tracker (Stack Implementation)

- **Scenario**: You're working for a library, and your task is to manage the last book returned to the library. Implement a stack to keep track of books, allowing for operations like push (add a book), pop (remove the most recently returned book), and peek (check which book was last returned).

2. Customer Service Call Center (Queue with Two Stacks)

- **Scenario**: You're managing a call center where customer calls come in and wait to be attended. Use two stacks to simulate how calls are processed in the queue, where enqueue adds a call to the waiting line, and dequeue processes the first call in line.

3. Parentheses Validator (Balanced Parentheses Checker)

- **Scenario**: You're building a code editor, and you need to verify that users' code has properly balanced brackets. Implement a stack to scan through the input code and determine if all opening brackets have a matching closing bracket.

4. Text Reverser (Reverse a String Using Stack)

- **Scenario**: You work for a social media app that wants to implement a 'reverse text' feature for creative posts. Use a stack to reverse the text input by a user, flipping it from end to start.

5. Ride Ticket Queue (Circular Queue)

- **Scenario**: You manage the queue system for a popular amusement park ride. Implement a circular queue to ensure that once the end of the line is reached, people move to the start of the line in a loop as needed.

6. Video Playback (Linked List Reversal)

- **Scenario**: You're building a video player app, and the app needs a feature to go backward through previously watched scenes. Implement a function to reverse the linked list of scenes for playback.

7. Palindrome Detector (Palindrome Checker Using Stack)

- **Scenario**: You're developing a game that asks players to identify palindromic words. Implement a function using a stack to check if a given word reads the same forwards and backwards.

8. Emergency Response System (Priority Queue Implementation)

- **Scenario**: In a city, an emergency response system needs to prioritize fire, medical, and police calls. Implement a priority queue where each type of emergency has a priority level, ensuring the most urgent calls are attended first.

9. Survey Analysis (Find Middle of a Linked List)

- **Scenario**: You're analyzing customer feedback, and you need to find the central opinion from a linked list of responses. Implement a function to find the middle response efficiently.

10. Detecting Loop in a Delivery Route (Cycle Detection in Linked List)

- **Scenario**: You're working on route planning software for delivery trucks and need to identify if the route has loops that would cause the driver to visit the same location twice. Use Floyd's Cycle-Finding algorithm to detect loops in the route.

11. Personal Finance App (Binary Search Tree Implementation)

- **Scenario**: You're developing a personal finance app to manage and search for transactions. Create a binary search tree (BST) to store and find transactions based on date, amount, or type.

12. Website Page History (BST Level Order Traversal)

- **Scenario**: You're building a browser feature that allows users to see their page history in order of visits. Implement a level order traversal on a BST that stores pages based on their visit date and time.

13. Friendship Network (Graph Representation)

- **Scenario**: You're designing a social network platform. Represent the network of friends using adjacency lists or an adjacency matrix to store connections between users.

14. Friend Finder (Depth-First Search)

- **Scenario**: You work for a dating app, and users want to find friends of their friends. Implement DFS to traverse the friendship graph and find potential matches.

15. City Transportation Planner (Breadth-First Search)

- **Scenario**: You're working on an app that plans the shortest route between subway stations. Use BFS to traverse the transportation network and find the shortest path from one station to another.

16. Event Merging (Merge Two Sorted Linked Lists)

- **Scenario**: You're developing an event planning app and need to combine two lists of event times while keeping them sorted. Implement a function that merges two sorted linked lists.

17. Online Shopping Cart (Hash Table Implementation)

- **Scenario**: You're developing an online store and need to keep track of product IDs and their availability. Use a hash table to store and quickly look up items in the shopping cart.

18. Mouse Movement

- **Scenario**: The mouse pointer can be restricted in particular rectangle. The idea is to create a function called **restrictmouse()** which takes four parameters which containing X coordinate and Y coordinate. First point mention the top of the rectangle and the second point mention the bottom of the rectangle. Below are the functions used for the same:
  - **initmouse():** use to initialize mouse.
  - **showmouse():** shows the mouse pointer on the output screen.
  - **restrictmouse():** used to set Horizontal and vertical limit of the mouse pointer by setting the following parameters. **AX = 7** for horizontal and **AX = 8** for vertical.

19. Mouse Movement extension

- **Scenario**: This following program makes use of some sub function, which were already discussed previously (Mouse Movement), and shows how they can be used to write useful programs like free-hand drawing. Below are the functions used:
  - **initmouse():** use to initialize mouse.
  - **showmouse():** shows mouse pointer on the output screen.
  - **hidemouse():** used to hide mouse while drawing.
  - **getmouseposition():** Fetches current location of the pointer and draw line accordingly.

20. The Sieve of Eratosthenes

- **Scenario:** A prime integer is any integer greater than 1 that can be divided evenly only by itself and 1. The Sieve of Eratosthenes is a method of finding prime numbers. It works as follows:

  a) Create an array with all elements initialized to 1 (true). Array elements with prime subscripts will remain 1. All other array elements will eventually be set to zero.

  b) Starting with array subscript 2 (subscript 1 is not prime), every time an array element is found whose value is 1, loop through the remainder of the array and set to zero every element whose subscript is a multiple of the subscript for the element with value 1. For array subscript 2, all elements beyond 2 in the array that are multiples of 2 will be set to zero (subscripts 4, 6, 8, 10, and so on.). For array subscript 3, all elements beyond 3 in the array that are multiples of 3 will be set to zero (subscripts 6, 9, 12, 15, and so on.).

When this process is complete, the array elements that are still set to 1 indicate that the subscript is a prime number. Write a program that uses an array of 1000 elements to determine and print the prime numbers between 1 and 999. Ignore element 0 of the array.

21. Missing number in array

- **Scenario**: Given an array of size N-1 such that it only contains distinct integers in the range of 1 to N. Displaymissing element. Complete the function MissingNumber() that takes array and N as input parameters and returns the value of the missing number.
  Input:
  N = 5
  A[] = {1,2,3,5}
  Output: 4

23. Leaders in an Array

- **Scenario**: Given an array A of positive integers. Your task is to find the leaders in the array. An element of array is leader if it is greater than or equal to all the elements to its right side. The rightmost element is always a leader.
  The task is to complete the function leader() which takes array A and n as input parameters and returns an array of leaders in order of their appearance.
  Input:
  n = 6
  A[] = {16,17,4,3,5,2}
  Output: 17 5 2
  Explanation: The first leader is 17 as it is greater than all the elements to its right. Similarly, the next leader is 5. The right most element is always a leader so it is also included.

24. K^{th} Smallest Element

- **Scenario**: Given an array arr[] and an integer K where K is smaller than size of array, the task is to find the Kth smallest element in the given array. It is given that all array elements are distinct.
  Your task is to complete the function k^{th} Smallest() which takes the array arr[], integers l and r denoting the starting and ending index of the array and an integer K as input and returns the K^{th} smallest element.
  Input:
  N = 6
  arr[] = 7 10 4 3 20 15
  K = 3
  Output: 7
  Explanation: 3rd smallest element in the given array is 7.

25. Majority Element

- **Scenario**: Given an array A of N elements. Find the majority element in the array. A majority element in an array A of size N is an element that appears more than N/2 times in the array. The task is to complete the function majority Element () which returns the majority element in the array. If no majority exists, return -1.
  Input:
  N = 5
  A[] = {3,1,3,3,2}
  Output:
  3
  Explanation:
  Since, 3 is present more than N/2 times, so it is the majority element.

26. Minimum Number of Jumps

- **Scenario**: Given an array of N integers arr[] where each element represents the maximum length of the jump that can be made forward from that element. This means if arr[i] = x, then we can jump any distance y such that $y \leq x$.
  Find the minimum number of jumps to reach the end of the array (starting from the first element). If an element is 0, then you cannot move through that element.
  Note: Return -1 if you can't reach the end of the array.
  Your task is to complete function minJumps() which takes the array arr and it's size N as input parameters and returns the minimum number of jumps. If not possible return -1.
  Input:
  N = 11
  arr[] = {1, 3, 5, 8, 9, 2, 6, 7, 6, 8, 9}
  Output: 3
  Explanation:
  First jump from 1st element to 2nd element with value 3. Now, from here we jump to 5th element with value 9, and from here we will jump to the last.

27. Equilibrium Point

- **Scenario**: Given an array A of n positive numbers. The task is to find the first Equilibrium Point in an array. Equilibrium Point in an array is a position such that the sum of elements before it is equal to the sum of elements after it. The task is to complete the function equilibriumPoint() which takes the array and n as input parameters and returns the point of equilibrium. Return -1 if no such point exists.
  Note: Retun the index of Equilibrium point.
  Input:
  n = 5
  A[] = {1,3,5,2,2}

Output: 3

Explanation:

equilibrium point is at position 3 as elements before it (1+3) = elements after it (2+2).

28. Inversion Count in an Array

- **Scenario**: Given an array of integers. Find the Inversion Count in the array. Inversion Count: For an array, inversion count indicates how far (or close) the array is from being sorted. If array is already sorted then the inversion count is 0. If an array is sorted in the reverse order then the inversion count is the maximum. Formally, two elements a[i] and a[j] form an inversion if a[i] > a[j] and i < j.

  Your task is to complete the function inversionCount() which takes the array arr[] and the size of the array as inputs and returns the inversion count of the given array.

  Input: N = 5, arr[] = {2, 4, 1, 3, 5}

  Output: 3

  Explanation: The sequence 2, 4, 1, 3, 5 has three inversions (2, 1), (4, 1), (4, 3).

29. Trapping Rain Water

- **Scenario**: Given an array arr[] of N non-negative integers representing the height of blocks. If width of each block is 1, compute how much water can be trapped between the blocks during the rainy season.

  Input:

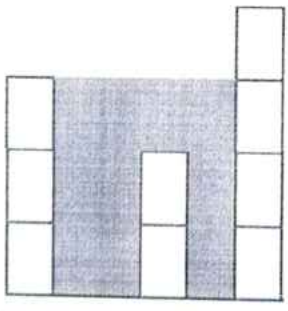
  N = 6

  arr[] = {3,0,0,2,0,4}

  Output:

  10

  Explanation:



Bars for input {3, 0, 0, 2, 0, 4}
Total trapped water = 3 + 3 + 1 + 3 = 10

The task is to complete the function trappingWater() which takes arr[] and N as input parameters and returns the total amount of water that can be trapped.

30. Minimum Platforms

- **Scenario**: Given arrival and departure times of all trains that reach a railway station. Find the minimum number of platforms required for the railway station so that no train is kept waiting. Consider that all the trains arrive on the same day and leave on the same day. Arrival and departure time can never be the same for a train but we can have arrival time of one train equal to departure time of the other. At any given instance of time, same platform can not be used for both departure of a train and arrival of another train. In such cases, we need different platforms.

  Your task is to complete the function findPlatform() which takes the array arr[] (denoting the arrival times), array dep[] (denoting the departure times) and the size of the array as inputs and returns the minimum number of platforms required at the railway station such that no train waits.

  Note: Time intervals are in the 24-hour format(HHMM) , where the first two characters represent hour (between 00 to 23) and the last two characters represent minutes (this may be > 59).

  Example 1:
  Input: n = 6
  arr[] = {0900, 0940, 0950, 1100, 1500, 1800}
  dep[] = {0910, 1200, 1120, 1130, 1900, 2000}
  Output: 3
  Explanation:
  Minimum 3 platforms are required to safely arrive and depart all trains.

31. Next Greater Element in an Array

- **Scenario**: Given an array arr[ ] of size N having elements, the task is to find the next greater element for each element of the array in order of their appearance in the array. Next greater element of an element in the array is the nearest element on the right which is greater than the current element.

  If there does not exist next greater of current element, then next greater element for current element is -1. For example, next greater of the last element is always -1.

  Input:
  N = 4, arr[] = [1 3 2 4]
  Output:
  3 4 4 -1
  Explanation:
  In the array, the next larger element to 1 is 3 , 3 is 4 , 2 is 4 and for 4 ? since it doesn't exist, it is -1.

You only need to complete the function nextLargerElement() that takes list of integers arr[] and N as input parameters and returns list of integers of length N denoting the next greater elements for all the corresponding elements in the input array.

32. Dynamic Memory Allocator Simulation Using Linked Lists

- **Scenario**: Simulate a memory allocation system using linked lists to represent memory blocks.

33. Graph-Based Route Finder

- **Scenario:** Build a route-finding application that uses shortest path algorithms like Dijkstra's or A*.

34. Efficient Sorting Visualizer

- **Scenario:** Develop an interactive visualization tool for sorting algorithms such as QuickSort, MergeSort, and HeapSort.

35. Event Calendar

- **Scenario:** Use a hash table to store events with quick search functionality by date.

36. Weather Data Analysis

- **Scenario:** Use binary search trees to organize and retrieve temperature records efficiently.

37. Memory Matching Game

- **Scenario:** Develop a matching game that can check if the two flipped cards have the same values and if they have the same "flipped" property (flipped: true), then we can remove them from the list.

38. Simple Banking System

- **Scenario:** Create a banking system where users can create accounts, deposit/withdraw money, and view their balance. Use classes to model accounts, transactions, etc.

39. Employee Management System Using OOP

- **Scenario:** Design a system that stores and manages employee data such as personal information, salary, and work hours. Implement inheritance to classify employees into different categories.

40. Vehicle Rental Service

- **Scenario:** Create classes for vehicles and rentals to manage vehicle availability and bookings.

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ANNEXURE - IV

Syllabi of
II Semester
MBA Programme
for Batch Admitted in 2024-25
(Computer Science and Business Systems)
Under Flexible Curriculum
[ITEM CSBM: 5]

Recommended in the Board of Studies Meeting of Centre for CSBM held on 08th December 2024

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Scheme of Evaluation

MBA II Semester *(for batch admitted in academic session 2024-25)*

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation													
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment	Major Evaluation	Continuous Evaluation	Major Evaluation		L	T	P				
1	70241201	DC	Human Resource Management	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2	70241202	DC	Supply Chain Management	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
3	70241203	DC	Financial Management	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
4	70241204	DC	Operations Management	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
5	70241205	DC	Business Research Methods	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
6	70241206	DC	Data Science using Python	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
7	70241207	DC	Digital Marketing	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
8	702412XX	DE	Departmental Elective (DE-1)	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
9	702412XX	SPC	Specialization Course (SPC-1)	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
10	70241208	SLP	Seminar/Presentation*	-	-	-	-	70	30	100	-	-	2	1	Mentoring	SO	-
11	70241209	CNEC	Classified Novel Engaging Course (Activity Based Learning)	-	-	-	-	-	50	50	-	1	-	1	Interactive	SO	-
Total				180	180	270	270	70	80	1050	23	5	2	29	-	-	-
12	70241221	MAC	Business and Legal Environment	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
13	70241222	MWS	Mandatory Workshop on Computer Vision at Department Level (Duration: Two Days)											GRADE	Interactive	-	-
14	70241223	MWS	Mandatory Workshop on Spreadsheet Modeling at Department Level (Duration: Two Days)											GRADE	Interactive	-	-

MCQ: Multiple Choice Question PP: Pen Paper SO: Submission + Oral OB: Open Book

*Seminar/Presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

Summer Internship: 4-6 weeks duration: To be Credited in III Semester

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Scheme of Evaluation

MBA II Semester *(for batch admitted in academic session 2024-25)*

DE-1			
S. No.	Course Code	Category Code	Course Name
1	70241210	DE	Total Quality Management
2	70241211	DE	Service Marketing
3	70241212	DE	Financial Institution & Markets

SPC-1			
S. No.	Course Code	Category Code	Course Name
1	70241213	SPC	Negotiation & Conflict Management
2	70241214	SPC	Exploratory Data Analysis

Mode of Learning						Mode of Examination				
Theory		CNEC	Lab			Theory			Lab	
Face to Face	Online	Interactive	Mentoring	Experiential	Experimental	PP	MCQ	OB	SO	Total Credits
27	0	1	1	0	0	27	0	0	2	29
93.1	0	3.45	3.45	0	0	93.1	0	0	6.9	Credits %

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HUMAN RESOURCE MANAGEMENT
70241201

COURSE OBJECTIVES

- To provide a comprehensive understanding of Human Resource Management.
- To explore the strategic role of HR in achieving organizational goals.
- To analyze HR functions like recruitment, training, and performance appraisal.
- To evaluate contemporary HR challenges and solutions in a globalized context.

Unit I

Fundamentals of Human Resource Management: Concept, Nature, and Scope of HRM, Evolution of HRM and the Role and skills of HR in Organizations, HRM vs. Personnel Management, Strategic Human Resource Management (SHRM), Emerging Trends in HRM: Technology and HR, Global HRM.

Unit II

Recruitment, Selection, and Workforce Planning: Job Analysis, Job Design, and Job Descriptions, Recruitment: Process, Sources, and Strategies, Selection: Steps, Methods, and Tools, Workforce Planning and Talent Management, Challenges in Recruitment and Selection.

Unit III

Training, Development, and Performance Management: Training Needs Assessment, Methods and Techniques of Training, Career Development and Succession Planning, Performance Appraisal Systems: Methods and Challenges, Linking Performance Management to Organizational Strategy.

Unit IV

Compensation Management and Employee Benefits: Components of Compensation: Salary, Incentives, Benefits, Job Evaluation and Pay Structure Design, Legal and Ethical Issues in Compensation, Employee Welfare, Health, and Safety Programs, Executive Compensation and Trends.

Unit V

Employee Relations, HR Analytics, and Future Trends: Industrial Relations: Grievances, Disciplinary Procedures, and Negotiation, Employee Engagement and Organizational Culture, HR Analytics: Tools, Techniques, and Applications, Diversity and Inclusion in the Workplace, Future Trends in HRM: AI in HR, Gig Economy, and Remote Work.

RECOMMENDED BOOKS

1. Human Resource Management by Gary Dessler, Pearson.
2. Managing Human Resources by Wayne F. Cascio, McGraw Hill.
3. Human Resource Management: Text and Cases" by K. Aswathappa, McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. describe the emerging trends in the field of human resource management.

CO2. design effective recruitment and selection strategies to align with organizational goals.

CO3. implement effective training, and performance management systems.

CO4. develop comprehensive compensation and benefits plans.

CO5. integrate HR analytics in strategic decision-making..

CO-PO Mapping Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	-		2	-	-	1	2	-	2
CO2	3	2	-	1	2	-	-	1	3	2	1
CO3	3	2	1	1	3	2	-	2	2	2	1
CO4	3	2	-	2	3	-	-	1	2	2	2
CO5	3	2	2	2	3	2	-	2	2	3	2

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SUPPLY CHAIN MANAGEMENT
70241202

COURSE OBJECTIVES

- To develop an understanding of strategic importance of supply chain management.
- To equip students with knowledge of demand forecasting strategies.
- To explore distribution network design and e-supply chains in optimizing operations.
- To analyze supply chain network design, and strategies for managing uncertainty.

Unit I

Foundations of Supply Chain Management: Evolution and Concept: A comprehensive overview of the evolution of supply chain management, its core concepts, and its role in modern business. Objectives and Importance: A deep dive into the primary objectives of supply chain management, including cost reduction, customer satisfaction, and operational efficiency. Competitive Advantage, Analytics in SCM. Supply Chain Planning. Supply Chain Drivers. Supply Chain Strategy. Strategic fit.

Unit II

Demand Forecasting and Inventory Management: Forecasting Methods. Bullwhip Effect and Time Series Analysis. Forecasting Errors and Measurement. Tracking Signal and Seasonality Models. forecasting Using Multiple Characteristics. Inventory Management. Multi-Echelon Inventory Management.

Unit III

Distribution Network Design and E-Supply Chain: Distribution Network Design. Factors Influencing Distribution Network Design. Inventory Management in Distribution Networks. E-Supply Chain.

Unit IV

Supply Chain Network Design and Optimization: Network Design of Global Supply Chains. Alternative Channels of Distribution. Location Decisions. Network Optimization Models. Uncertainty in Network Design. Flexibility in Supply Chain.

Unit V

Advanced Topics in SCM: Optimal Product Availability. Time Value of Money in Supply Chain. Advanced Analytics in Supply Chain. Predictive Modeling in Forecasting. Representation of Uncertainty. Decision Trees for Handling Uncertainty. Modeling Flexibility in Supply Chain. Trends, Challenges, and Future of SCM.

RECOMMENDED BOOKS

1. Supply Chain Management- Text and Cases. by J. Shah, Pearson India.
2. Logistics and Supply Chain Management: Cases and Concepts by G Raghuram& N Rangaraj, Mac Millan.
3. Supply Chain Management –Strategy, Planning and Operation by Chopra, Meindl & Kalra, Pearson.
4. Logistics & Supply Chain Management: Strategies for Reducing Cost & Improving Service by Christopher, M, Pearson India.
5. Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies by Levi, S. D. Tata McGraw-Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. analyze a comprehensive understanding of SCM concepts, principles, and strategies.

CO2. apply quantitative and qualitative methods to forecast demand.

CO3. design and optimize supply chain networks to improve efficiency and reduce costs.

CO4. evaluate and assess the impact of various factors on supply chain performance.

CO5. utilize advanced analytics to enhance supply chain decision-making and operations.

CO-PO Mapping Matrix											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	1	-	1	1	2	1	2	1	2	2	-
CO2	1	2	-	1	-	2	1	1	2	3	3
CO3	2	-	-	1	-	1	1	1	2	3	2
CO4	1	1	2	-	-	1	1	1	2	3	-
CO5	1	1	-	-	-	1	1	1	2	3	3

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FINANCIAL MANAGEMENT
70241203

COURSE OBJECTIVES

- To understand the scope of financial management and basic financial decisions.
- To analyze investment decisions, cost of capital, and long-term financing sources.
- To evaluate leverage, and capital structure theories.
- To gain insights into asset management for effective planning.

Unit I

Financial Decisions: Introduction: Concepts, Nature, Scope, Function and Objectives of Financial Management, Basic Financial Decisions: Investment, Sources of Finance Profit maximization vs. Wealth maximization, Functions of Finance Manager in the Modern Age.

Unit II

Investment Decision and Cost of Capital: Sources of Long-Term Capital Equity, Debt, Term Loan, Preference share, Hybrid Securities, Internal Funds- Issues relating Financing Decisions. Cost of Capital: Meaning, Computation of Cost of Equity, cost of Debt, Cost of Preference Capital, Cost of Internal Reserve, Weighted Average Cost of Capital.

Unit III

Leverage and Capital Structure Analysis: Analysis of Operating Leverage and Financial Leverage-Combined Financial and Operating Leverage. Concept of Capital Structure: Determinants, Theories of Capital Structure, Relevance and Irrelevance, Problems of Optimal, Capital Structure.

Unit IV

Dividend Relevance: Factors affecting Dividend Policy, Forms of Dividends, Types of Dividend Policies, Dividend Models Walter and Gordon Model, Miller- Modigliani (MM) Hypothesis. Long Term Investment Analysis: Investment idea Generation – Tools and techniques of Analysis- Risk Analysis in Capital Investment Decisions.

Unit V

Short Term Asset Management: Short term sources of financing, Strategic Planning and Estimation of Short-Term Funding. Need –Financing Sources – Computation of Cost of Short-term Fund, Management of Cash, Inventory and Receivables.

RECOMMENDED BOOKS

1. Financial Management by Khan and Jain, Tata McGraw Hill, 7th Edition.
2. Financial Management by I M Pandey, Vikas Publication, 11th Edition.
3. Fundamental of Financial Management by Sheeba Kapil, Wiley,2015
4. Financial Management by Bark Demazo Thampy, Pearson, 2nd Edition.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. apply financial management principles to solve real-world financial problems.

CO2. assess the cost of capital for strategic financial decisions.

CO3. examine structure theories to guide optimal decision-making.

CO4. formulate investment strategies and risk analysis techniques.

CO5. design effective short-term asset management and receivables.

CO-PO Mapping Matrix											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	1	-	1	1	2	1	2	1	2	2	-
CO2	1	2	-	1	-	2	1	1	2	3	3
CO3	2	-	-	1	-	1	1	1	2	3	2
CO4	1	1	2	-	-	1	1	1	2	3	-
CO5	1	1	-	-	-	1	1	1	2	3	3

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OPERATIONS MANAGEMENT
70241204

COURSE OBJECTIVES

- To learn the fundamentals, scope, and evolution of operations management.
- To understand forecasting techniques, and plant location evaluation methods.
- To gain knowledge of inventory management, and project scheduling methods.
- To give insight of Statistical Quality Control, Six Sigma, ISO Standards.

Unit I

Introduction to Operations Management: Objectives, Functions and Scope and Importance, Historical Evolution, Production Systems: Types – continuous, batch, job shop, and project-based, Operations Strategy: Importance and framework, Product Design & development: Product life Cycle, Principles of good product design.

Unit II

Forecasting Techniques: Need, type, Factors affecting forecasting, Qualitative and Quantitative methods, Measures of forecast accuracy, Error analysis. Facility layout and planning: Factors affecting plant location, Location evaluation methods, Factors affecting plant layout, Types of plant layouts and their applications.

Unit III

Production Planning & Control: Process Planning, Aggregate Production Planning: MPS, bill of Materials, MRP. Capacity Planning: Concepts, strategies, and challenges. Project scheduling: PERT, CPM. Inventory Management: Types of inventories, EOQ model, and inventory control techniques (ABC, VED), Perpetual and periodic inventory control systems.

Unit IV

Quality Management and Improvement: Concept of Quality, Total Quality Management (TQM), Total Productive Maintenance (TPM), Statistical Quality Control (SQC), Six Sigma, ISO Standards.

Unit V

Modern Concepts/Techniques: Just in Time (JIT), Lean Manufacturing, Kanban System, Enterprise Resource Planning (ERP), Supply Chain Management, Case Studies: Real-world applications in various industries.

RECOMMENDED BOOKS

1. Operation Management by K. N. Dervitsiotis, McGraw-Hill International Company.
2. Operations Management: R.S. Russell, and B.W. Taylor", Pearson Education
3. Industrial Engineering and Production Management M. Telsang, S. Chand & Company Ltd.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. examine the fundamental concepts and scope of operations management in organizations.

CO2. apply operations strategies to improve process efficiency and align with business objectives.

CO3. analyze supply chain and inventory systems for effective management and cost optimization.

CO4. evaluate quality management principles to enhance product and service standards.

CO5. formulate and control methods to ensure smooth operational execution.

CO-PO Mapping Matrix											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	1	-	2	3	-	1	2	3	1	1	-
CO2	2	1	-	2	1	2	3	-	3	1	3
CO3	-	-	-	-	1	-	-	3	1	1	-
CO4	1	2	3	2	-	2	-	3	1	3	-
CO5	3	-	3	-	1	1	2	-	3	2	3

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BUSINESS RESEARCH METHODS
70241205

COURSE OBJECTIVES

- To equip students with the skills to design and conduct business research projects.
- To familiarize students with quantitative and qualitative research methodologies.
- To enable students to analyze and interpret research data effectively.
- To develop the ability to present research findings clearly and professionally.

Unit I

Introduction to Business Research: Definition, Objectives, and Importance of Business Research, Types of Business Research: Exploratory, Descriptive, and Causal, Research Process: Steps and Key Considerations, Ethical Issues in Business Research, Role of Technology in Business Research.

Unit II

Research Design and Data Collection: Research Design: Types and Characteristics, Sampling Techniques: Probability and Non-Probability Sampling, Data Collection Methods: Primary vs. Secondary Data, Designing Questionnaires and Surveys, Challenges in Data Collection.

Unit III

Measurement, Scaling, and Hypothesis Testing: Concepts of Measurement and Scaling: Nominal, Ordinal, Interval, Ratio Scales, Reliability and Validity of Measurement Instruments, Formulating Hypotheses: Null and Alternative Hypotheses, Hypothesis Testing: Concepts, Errors, and Levels of Significance, Statistical Techniques for Hypothesis Testing: t-test, Chi-square Test, ANOVA.

Unit IV

Data Analysis and Interpretation: Data Preparation: Cleaning, Coding, and Tabulation, Descriptive Statistics: Measures of Central Tendency and Dispersion, Inferential Statistics: Correlation, Regression, and Time Series Analysis, Using Software Tools for Data Analysis (e.g., SPSS, Excel, or R), Interpretation of Results and Report Writing.

Unit V

Reporting and Presenting Research Findings: Components of a Research Report, Structuring the Report: Executive Summary, Methodology, Findings, and Recommendations, Visual Presentation of Data: Charts, Graphs, and Tables, Guidelines for Effective Oral Presentations, Future Trends in Business Research: Big Data, Analytics, and AI.

RECOMMENDED BOOKS

1. Business Research Methods by Naval Bajpai, Pearson Education.
2. Business Research Methods by Cooper, Schindler & Sharma, Tata McGraw Hill.
3. Business Research Methods by Bryman & Bell, Oxford University Press India.
4. Research Methods for Business A Skill Building Approach" by Uma Sekaran & Roger Bougie, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the fundamentals of business research and outline a structured research process.

CO2. design effective research frameworks and choose appropriate data collection methods.

CO3. apply measurement scales and perform hypothesis testing in research scenarios.

CO4. analyze and interpret research data using appropriate statistical tools.

CO5. create and present professional business research reports and findings.

CO-PO Mapping Matrix											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	-	-	2	-	-	1	3	-	2
CO2	3	2	1	1	2	-	-	1	3	2	1
CO3	3	2	2	2	3	2	-	2	2	2	1
CO4	3	2	-	2	3		-	1	2	2	2
CO5	3	2	2	2	3	2	-	2	2	3	2

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DATA SCIENCE USING PYTHON
70241206

COURSE OBJECTIVES

- To learn Python environment setup, and managing directories.
- To handle sequence data types like Strings, Lists, Tuples, and NumPy.
- To gain proficiency in using Pandas for data manipulation and exploration.
- To apply machine learning algorithms and create visualizations.

Unit I

Introduction of Python: Basics, Setting Working Directory, Creating and Saving a Script File, File Execution, Clearing Console, Removing Variables from Environment, Clearing Environment, Commenting Script Files, Variable Creation, Arithmetic and Logical Operators, Data Types and Associated Operations.

Unit II

Sequence Data Types & Operations: Sequence Data Types and Associated Operations Strings, Lists, Arrays, Tuples, Dictionary, Sets, Range, Numpy, Array.

Unit III

Data Frames & Data Handling: Data Frames, Data Frame Operations on Different Dataset, Reading Files, Exploratory Data Analysis, Data Preparation and Preprocessing.

Unit IV

Artificial Intelligence and Machine Learning Algorithms: Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Applications. Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields. Linear Regression, Logistic Regression, Decision Tree, Tree Creation with Entropy and Information Gain, IDE3 Algorithm, Random Forest, Naive Bayes Theorem, K-Nearest Neighbor and Different Ensemble Methods for Solving Real World Problems.

Unit V

Data visualization & Control Structures: Data Visualization on Different Dataset using Mat Plotlib and Sea Born Libraries, Scatter Plot, Line Plot, Bar Plot, Histogram, Box Plot, Pair Plot, Control Structures using Different Dataset, If-Else Family, For Loop, For Loop with If Breaks, While Loop, Functions.

RECOMMENDED BOOKS

1. Mastering python for data science, Samir Madhavan, Packt Publishing, 2015.
2. Python Data Science Handbook essential tools for working with data, Jake VanderPlas, 2nd edition, O'Reilly Media, 2022.
3. Data Analytics using Python Paperback, Bharti Motwani, Wiley, 2020.
4. Data Analytics Essentials, Bianca Szasz, Wiley, 2018.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. examine the concepts of Python programming.

CO2. define data types like Strings, Lists, Tuples, Dictionaries, Sets, Arrays, and NumPy to solve computational problems.

CO3. utilize Pandas for data manipulation, exploratory data analysis, and preprocessing across different datasets.

CO4. apply machine learning algorithms to solve real-world challenges.

CO5. create data visualizations using Matplotlib and Seaborn for effective analysis.

CO-PO Mapping Matrix											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	1	2	2	1	1	3	3	3
CO2	-	3	-	3	3	2	1	1	3	-	-
CO3	3	3	3	-	-	-	-	1	-	-	-
CO4	-	3	-	3	3	2	1	1	3	3	-
CO5	3	3	-	-	3	-	1	1	-	-	3

DIGITAL MARKETING
70241207

COURSE OBJECTIVES

- To understand digital marketing fundamentals and evolving trends.
- To develop skills for creating effective strategies across SEO, and social media.
- To analyze online consumer behavior, segmentation, and personalized targeting.
- To leverage analytics, big data, and privacy concerns.

Unit I

Fundamentals and Emerging Trends in Digital Marketing: Digital Marketing Meaning, Scope and Importance, Internet versus Traditional Marketing, Internet Marketing in India, Business response to emerging digital revolution, Digital devices, platforms, Media, Data and Technology. Emerging trends in Artificial Intelligence & Machine Learning in Digital Marketing.

Unit II

Digital Marketing Strategy and Conversion Optimization: Digital Marketing strategy, Digital conversion funnel, Customer Acquisition, Conversion and Retention, Acquisition, Search Engine Optimization, Paid Advertising, Search Advertising, Display Advertising, Social Media Marketing, Email Marketing, measuring success of search engine optimization. Voice Search Optimization, Affiliate Marketing and Influencer Marketing.

Unit III

Online Consumer Behavior and Targeting Techniques: Online Consumer Behavior: Decision Making Process; Problem Recognition, Information Search, Evaluation, Choice and Post Purchase Behavior, Online Consumer Segmentation; Online Marketing Mix, Consumer Segments & Targeting. Behavioral Targeting and Personalization Techniques.

Unit IV

Social Media Analytics and Big Data Applications: Social Media Analytics: Data Type and Collection, Structured and Semi-Structured Data, Social Media Metrics, Social Media ROI, Social Networks and Social Network Analysis; Social Media

Analytics with Unstructured Data, Text Mining, Social Customer Relationship Management, Text Mining for Communication and Reputation Management; Big Data, Internet of Things. Ethics and Privacy Concerns in Social Media Analytics, Sentiment Analysis in Social Media.

Unit V

Mobile Marketing and Advanced Digital Technologies: Mobile Marketing, Advertising on Mobile Devices, Mobile Apps, Tracking Mobile Marketing Performance, E-Marketing; Internet Marketing Strategy: Content Marketing. Programmatic Advertising and Real-Time Bidding, Integration of AR/VR in Digital Marketing.

RECOMMENDED BOOKS

1. Digital Marketing: Strategy, Implementation, and Practice by Chaffey & Ellis-Chadwick, Pearson Education.
2. Marketing 5.0: Technology for Humanity by Kotler, Kartajaya and Setiawan, Wiley
3. Social Media Marketing by Tuten and Solomon, Sage Publications.
4. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation by Ryan, Kogan Page.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. examine the concept of digital marketing and its importance.

CO2. analyze digital marketing strategies for better platform utilization.

CO3. investigate online consumer behavior and their requirements.

CO4. design social network analysis for success in the social market.

CO5. integrate augmented reality and virtual reality in digital marketing.

CO-PO Mapping Matrix											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	1	-	1	2	-	1	1	2	2	2
CO2	3	3	1	2	3	1	-	-	-	1	1
CO3	3	2		2	1	-	-	1	2	1	1
CO4	2	3		3	1	-	-		2	2	2
CO5	3	2		2	2	-	-	3	-	-	1

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BUSINESS AND LEGAL ENVIRONMENT
70241221

COURSE OBJECTIVES

- To acquaint the students with the knowledge of the legal framework.
- To develop the significant provisions of selected business laws.
- To them acquire the ability to address basic application- oriented issues.
- To develop problem solving technique with legal procedure.

Unit I

The Contract Act, 1872: Essential Elements of Valid Contract, Essential elements of Valid Contracts, Contracts of Indemnity & Guarantee, Contingent Contract, Quasi Contract, Discharge of contract, Breach of contract-Meaning & remedies, Agency - Creation of Agency – Agent and Principal (Relationship/rights), Types of Agency, Case Studies.

Unit II

Sale of Goods Act, 1930: Contract of sale of goods, Conditions & warranties, Transfer of property or ownership, Performance of the Contract of Sale, Rights of Unpaid Seller, Sale by Auction, Case Studies.

Unit III

The Negotiable Instrument Act, 1881: Negotiable Instruments – Meaning, Characteristics, Types, Parties, Holder and holder in due course, Negotiation and Types of Endorsements, Dishonor of Negotiable Instrument – Noting and Protest.

Unit IV

Business Environment and Economic Policies: Type of Environment-Internal, External, Micro and Macro Environment. Competitive Structure of Industries, Environmental Analysis and Strategic Management. Managing Diversity. Scope of Business, Characteristics of Business. Economic Policies, New Industrial Policy. FEMA, Monetary & Fiscal Policies. Consumer Protection Act. Liberalization, Privatization and Globalization of Indian Economy, Trends and Issues.

Unit V

Socio-Cultural, Political, and Technological Environments: Nature and Impact of Culture on Business, Culture and Globalization, Social Responsibilities of Business, Social Audit, Business Ethics and Corporate Governance, Technological Leadership And Followership, Sources of Technological Dynamics, Impact of Technology on Globalization, Transfer of Technology, Time Lags In Technology Introduction, Status of Technology In India, Management of Technology, Features and Impact of Technology.

RECOMMENDED BOOKS

1. Business Legislations for Management by M.C. Kuchhal, Vikas Publishing House
2. Elements of Mercantile Law by N.D. Kapoor, Sultan Chand & Sons
3. Business and Corporate Laws by Dr. P.C. Tulsian, Tata McGraw-Hill Education
4. Legal Aspects of Business by Ravinder Kumar, Cengage Learning India Pvt. Ltd.
5. Business Laws by S.D. Geet, Sultan Chand & Sons

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. examine the Legal Environment of Business.

CO2. explore basic legal knowledge in business transactions.

CO3. apply skills using standard business and legal terminology effectively.

CO4. differentiate between capitalism, socialism, and mixed economies.

CO5. assess political risk in global and domestic markets and develop strategies.

CO-PO Mapping Matrix											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	3	-	-	2	1	-	3	1	2
CO2	3	2		3		2	1	3	3	2	-
CO3	2	-	2	-	1	-	3	-	3	2	1
CO4	2	3	3	1		-	-	-	2	1	-
CO5	1	-	3		2	1	2	-	3	2	2

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TOTAL QUALITY MANAGEMENT
70241210

COURSE OBJECTIVES

- To understand the fundamental principles of quality management.
- To explore tools and frameworks for quality improvement and innovation.
- To analyze the relationship between quality, cost, and productivity.
- To study global quality standards and strategies for quality systems.

Unit I

Introduction to Quality: Definition of Quality, Evolution of Quality Concepts, Types of Quality, Relation between Quality and Cost Productivity, Quality Leadership and Business Strategy, Dimensions of Quality, Basic Concepts of TQM, Principles of TQM, Quality Council, Quality Costs – Analysis and Techniques for Cost Control of Quality, Barriers to TQM Implementation, Global Perspective on Quality Standards.

Unit II

Quality Management Framework: Deming Philosophy on Quality, Juran Trilogy, PDCA Cycle, Control of Quality, Quality Planning and Sales Income, Strategic Quality Management, Quality by Design, Designing for Quality.

Unit III

Organizational Quality Development: Quality Function, Coordination of Quality Activities for Cross-Functional Aspects, Developing a Quality Culture, Standardization of Corporate-Wide Methods for Cost Cutting, Role of Upper, Middle Management, Workforce, and Quality Director, Quality Circles, Role of Organizational Change in Quality Initiatives.

Unit IV

Tools and Techniques for Quality Improvement: The Seven Tools of Quality, Concept of Six Sigma, New Seven Management Tools, Kaizen, Just-in-Time (JIT), Taguchi Methods, Lean Manufacturing Principles, Recent Techniques for Quality Improvements.

Unit V

Quality Standards and Auditing: Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality Systems, Documentation, Quality Auditing TS 16949 ISO 14000 – Concept, Requirements, and Benefits, Introduction to ISO 45001 (Occupational Health & Safety), Sustainability and Environmental Quality Standards.

RECOMMENDED BOOKS

- Total Quality Management by Charantimath, Pearson India.
- Total Quality Management. by Mukherjee, PHI Learning.
- Total Quality Management: An Integrated Approach by Gupta, A., & Mahapatra, McGraw Hill.
- Quality Management for Organizational Excellence: Introduction to Total Quality (8th ed.) by Goetsch & Davis, Pearson.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the principles and importance of quality management in organizations.

CO2. apply statistical and managerial tools for quality improvement.

CO3. foster organizational change and leadership to build a quality-centric culture.

CO4. develop strategies for integrating quality initiatives into business operations.

CO5. evaluate the implementation of quality standards such as ISO 9000 and ISO 14000.

CO-PO Mapping Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	-	-	3	-	-	2	1	-	3	1	2
CO2	3	2	-	3		2	1	3	3	2	-
CO3	2	-	2	-	1	-	3	-	3	2	1
CO4	2	3	3	1	-	-	-	-	2	1	-
CO5	1	-	3	-	2	1	2	-	3	2	2

SERVICE MARKETING
70241211

COURSE OBJECTIVES

- To understand the fundamentals and growth of the service sector.
- To explore the service marketing mix, digital platforms, and social media impact.
- To analyze strategies for service innovation, CRM, and demand-supply management.
- To examine service quality, big data analytics, and sustainability.

Unit I

Marketing of Services: Introduction - Growth of the Service Sector - The Concept of Service, Characteristics of Services, Classification of Service, Designing the Service Blueprinting, Using Technology - Developing Human Resources, Building Service Aspirations. Role of Artificial Intelligence and Automation in Service Design.

Unit II

Marketing Mix in Services Marketing: The Seven Ps - Product Decisions - Pricing Strategies and Tactics - Promotion of Services and Placing or Distribution Methods for Services, Additional Dimensions in Services Marketing, People, Physical Evidence and Process, Internet as a Service Channel. Impact of Social Media and Digital Platforms on Services Marketing.

Unit III

Strategic Marketing Management for Services: Matching Demand and Supply through Capacity Planning and Segmentation - Internal Marketing of a Service - External versus Internal Orientation of Service Strategy. Service Innovation and Competitive Advantage, Customer Relationship Management (CRM) in Service Marketing.

Unit IV

Delivering Quality Services: Causes of Service-Quality Gaps, The Customer Expectations versus Perceived Service Gap, Factors and Techniques to Resolve this Gaps in Service Quality Standards, Factors and Solutions, The Service Performance Gap Key Factors and Strategies for Closing the Gap, Developing Appropriate and

Effective Communication about Service Quality. Use of Big Data and Analytics in Measuring Service Quality, Sustainability Practices in Service Delivery.

Unit V

Marketing of Services with Special Reference to Financial Services: Health Services, Hospitality Services Including Travel, Hotels and Tourism, Professional Services, Public Utility Services - Communication Services, Educational Services. Marketing of Emerging Services like E-Governance and IT-Based Services.

RECOMMENDED BOOKS

1. Service Management and Marketing: Managing the Service Profit Logic by Gronroos, Wiley.
2. Service Marketing: People Technology and Strategy by Lovelock, Wirtz & Chatterjee, Pearson Education.
3. Services Marketing: Integrating Customer Focus across the Firm by Zeithaml, Gremle, Bitner, & Pandit, Mcgraw Hill.
4. Services Marketing: The Indian Perspective. by Ravi Shanker, Excel Books.
5. Services Marketing: Text & Cases by Rajendra Nargundkar, Mcgraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. assess the role of technology in service design.

CO2. analyze the impact of social media and digital platforms on service marketing.

CO3. apply tools for measuring and managing customer satisfaction.

CO4. develop measures to deliver quality in services.

CO5. analyze and apply the extended marketing mix to various service sectors.

CO-PO Mapping Matrix											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	1	3	-	3	2	-	1	1	2	1	3
CO2	3	3	1	2	1	1	-	-	-	1	1
CO3	2	3	-	2	1	-	-	1	2	1	2
CO4	2	2	-	3	1	-	-		2	3	3
CO5	1	2	2	3	2	-	-	3	-	-	1

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FINANCIAL INSTITUTION & MARKETS
70241212

COURSE OBJECTIVES

- To understand the structure and functioning of the financial system.
- To learn capital, IPOs, stock exchanges, and money market instruments.
- To explore the role of commercial banks, and risk management.
- To gain insights into modern financial instruments and their impact on markets.

Unit I

Introduction to Financial System and Economic Development: Indicators of Financial Development, Structure and Characteristics. Regulatory Institutions: SEBI (Security Exchange Board of India) and RBI (Reserve Bank of India).

Unit II

Capital Markets: Primary and Secondary Market, Structure, Nature, Significance and Players, IPO, Stock Exchanges, Stock Market Indices. Money Market: Structure, Operations, Players, Treasury Bills, Commercial Papers, Certificate of Deposit, Gilt Edged Securities and REPO's.

Unit III

Introduction to Commercial Banking: Role of Banks, Risk Management in Banks - Credit risk management, Operational Risk management, Market Risk management, Provident Fund, Pension Fund, Insurance Companies.

Unit IV

Introduction to Mutual Fund: Credit Rating Agencies, Merchant Bank, Venture Capital Funds, E-banking. Securitization, Indian Banking and the Financial Crisis, Asset Reconstruction Companies, Depositories, Credit Cards.

Unit V

Derivatives Market: Types of Derivatives, Important Concepts used in Derivatives Market, Pricing of Futures, Options and Swaps.

RECOMMENDED BOOKS

1. Financial Institutions and Markets: Structure, Growth and Innovations by L.M. Bhole and J. Mahakud, McGraw Hill
2. Financial Markets and Institutions by Frederic Mishkin and Stanley Eakins, Pearson Education.
3. Financial Institutions & Markets by Jeff Madura, Cengage.
4. Bond Evaluation, Selection and Management by R. Stafford Johnson, Wiley.
5. Analysis of Investments and Management of Portfolios by Frank Reilly and Keith Brown, Cengage.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. examine financial institutions and their features.

CO2. investigate the role of financial markets.

CO3. apply risk management techniques in banks.

CO4. analyze financial services with e-banking concepts and available funds in the market.

CO5. assess different derivative assets.

CO-PO Mapping Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	-	1	1	2	1	1	1	2	2	-
CO2	2	-	-	2	-	1	2	1	2	3	3
CO3	1	-	-	1	-	1	1	1	2	3	2
CO4	1	1	1	-	-	2	1	1	2	3	-
CO5	1	1		-	-	1	1	1	2	3	3

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EXPLORATORY DATA ANALYSIS
70241213

COURSE OBJECTIVES

- To understand the fundamentals of Exploratory Data Analysis.
- To implement data visualization techniques using Python libraries.
- To perform univariate data exploration through summary statistics and visualization.
- To apply bivariate data exploration for studying relationships between two variables.

Unit I

Exploratory Data Analysis: Introduction to EDA: Definition, Significance, and Scope of EDA in the Data Science Process. EDA vs. Classical/Bayesian Analysis: Comparison of Exploratory Methods with Traditional Analysis Methods. Tools for EDA: Overview of Software and Programming Languages used for EDA (Python, R, Tableau, Power BI). Visual Aids for EDA: Techniques such as Histograms, Box Plots, Scatter Plots, and Correlation Matrices. Data Transformation: Techniques like Merging Datasets, Reshaping, Pivoting, and other Transformation Methods.

Unit II

EDA Using Python: Pandas Basics: Introduction to Pandas, Data Structures like Series, DataFrame, and Index. Data Indexing and Selection: Methods to Access Data using.loc, .iloc, Boolean Indexing, and Filtering. Data Cleaning: Handling Missing Data, Cleaning Data, and Imputation Methods. Combining Datasets: Using Methods like concat(), append(), merge(), and join() for Combining and Merging Datasets. Grouping and Aggregation: Grouping Data and Applying Aggregation Functions such as sum(), mean(), count(). Pivot Tables: Creating and using pivot tables for summarizing data. Vectorized String Operations: Using Vectorized Operations for Efficient Manipulation of String Data.

Unit III

Univariate Analysis: Single Variable Analysis: Distribution, Central Tendency, and Spread. Numerical Summaries: Mean Median, Mode, Range, Variance, and Standard deviation. Scaling and Standardizing Data: Techniques like Min-Max scaling, Z-score

Standardization. Inequality Measures: Metrics such as Gini index and others for Analyzing Data Distribution and Inequality.

Unit IV

Bivariate Analysis: Exploring Relationships between Two Variables: Scatter Plots, Correlation Coefficients, and Covariance. Contingency Tables: Analyzing Categorical Data Using Contingency Tables and Chi-square Tests. Percentage Tables: Analyzing Percentage Tables to understand the Relationship Between Two Categorical Variables. Resistant Lines: Fitting Robust Lines to Data for Better Analysis of Relationships Between Variables.

Unit V

Multivariate and Time Series Analysis: Introducing a Third Variable: Exploring Relationships when Adding a Third Variable. Causal Explanations: Methods for Establishing Causality Between Variables using Statistical Models. Time Series Analysis: Fundamentals of Time Series Data, Data Cleaning, Time-Based Indexing, and Visualizations. Grouping and Re Sampling Time Series Data: Techniques for Aggregating and re sampling Data Based on Time Intervals.

RECOMMENDED BOOKS

1. Hands-On Exploratory Data Analysis with Python by Suresh Kumar Mukhiya, Usman Ahmed, Packt Publishing.
2. Python Data Science Handbook: Essential Tools for Working with Data"by Jake Vander Plas, O Reilly.
3. Catherine Marsh, Jane Elliott, "Exploring Data: An Introduction to Data Analysis for Social Scientists, Wiley Publications.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. examine the fundamentals of Exploratory Data Analysis.

CO2. implement data visualization techniques using Python and Matplotlib for insights.

CO3. explore univariate data exploration through statistical measures and visualization.

CO4. investigate bivariate data exploration.

CO5. apply multivariate and time series and visualize complex datasets.

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CO-PO Mapping Matrix											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	1	3	-	-		3	2	1	2	3	2
CO2	-	3	-	1	-	-	1	1	-	3	1
CO3	-	3	1	-	-	2	-	2	2	2	1
CO4	3	3	-	-	3	-	-	1		2	2
CO5	-	3	2	-	-	2	--	2	2	3	2

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NEGOTIATION & CONFLICT MANAGEMENT
70241214

COURSE OBJECTIVES

- To learn how to achieve collaborative, value-adding negotiation outcomes.
- To develop the skill to mediate disputes and become a more skilled negotiator.
- To increase knowledge and confidence in collaborative negotiations.
- To strengthen relationships while maximizing negotiated outcomes.

Unit I

Understanding Conflict: Concept, Importance, Nature, Components, Sources of Conflict, Types of Conflict, Processes & Dynamics of Conflict – Process and Structural Models, Functional & Dysfunctional Conflict, Relationship Between Conflict and Performance in Team, Levels Of Conflict, Intrapersonal, Interpersonal, Group & Organizational, Sources of Conflict - Intrapersonal, Interpersonal, Group & Organizational.

Unit II

Conflict Management Design: Conflict Management Process, Conflict Trends, Conflict Distribution, Conflict Mapping and Tracking. Managing Team & Organization Conflict, Collaborative Techniques to Resolve Team Conflict, Strategies to Resolve Organizational Conflict, Different Types of Power & Their Roles in Conflict Situations. Conflict Resolution and Cost, Conflict Resolution Models.

Unit III

Negotiation Strategies: Strategic and Tactical Approaches to Negotiation. Negotiating Processes: BATNA, Strategy and Tactics for Distributive Bargaining, Integrative Negotiation, Negotiation Strategy & Planning. Negotiation Power, Sources of Power, Ethics in Negotiation. Third Party Approaches: Third Party Interventions, Formal Intervention Methods: Arbitration, Mediation and Process Consultation, Informal Intervention Methods, Best Practices in Negotiation.

Unit IV

Conflict & Negotiation Management Tools and Techniques: Introduction of Tools and Techniques, Conflict Mapping, Brainstorming and Consensus-Building for

Resolving Conflicts, Mediation Process, Facilitation Techniques, Building Agreements. Role of Power in Negotiation & Communication.

Unit V

International and Cross-Cultural Negotiations: Understanding Cultural Values and Negotiation Norms. Team-Based International Negotiation, Cultural Perspectives in Conflict, Cultural Dimensions Such as Individualism vs. Collectivism and High-Context vs. Low-Context Cultures. Cross-Cultural Communication, Strategies for Managing Conflicts in Diverse Cultural Settings.

RECOMMENDED BOOKS

1. Conflict Management and Resolution: An Introduction by Ho-Won Jeong, Routledge.
2. Managing Conflict in a Negotiated World: A Guide to Negotiating in International Settings by Peter T. Coleman, Morton Deutsch, Eric C. Marcus, Wiley-Blackwell.
3. Conflict Management: A Practical Guide to Developing Negotiation Strategies by Barbara, A. Budjac Corvette, Pearson Education.
4. Managing Conflict and Negotiation by B. D. Singh, Excel Books.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. analyze the concept of conflict and their dynamics in team performance.

CO2. apply conflict management processes and strategies using collaborative techniques.

CO3. develop strategic and tactical negotiation skills for bargaining.

CO4. utilize conflict management tools.

CO5. assess the impact of cultural differences on negotiation and conflict management.

CO-PO Mapping Matrix											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	-	-	3	-	1	2	3	1	1	-	-
CO2	1	-	2	1	2	3	-	3	1	3	3
CO3	-	2	-	1	-	3	-	1	1	-	-
CO4	2	3	2	-	2	-	3	1	3	-	2
CO5	-	3	-	1	1	2	-	3	2	3	-

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ANNEXURE - V

Syllabus/Module of Classified Novel Engaging Course for II Semester MBA Programme for Batch Admitted in 2024-25 (Computer Science and Business Systems) Under Flexible Curriculum

[ITEM CSBM: 6]

Recommended in the Board of Studies Meeting of Centre for CSBM held on 08th December 2024

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ESSENTIALS OF INNOVATIVE TOOLS & SERVICES
70241209

COURSE OBJECTIVES

- To learn about how to effectively utilize AI tools like ChatGPT, Grammarly, and Synthesia for improving writing, communication, and content creation skills.
- To understand the role of digital platforms like ClickUp in managing projects and enhancing team collaboration.
- To gain insights into creating presentations and videos using SlidesAI and Synthesia.
- To explore ethical considerations and practical applications of AI in business operations.

MODULE 1: Tools for Enhanced Productivity and Learning

AI-Assisted Tools

Overview of ChatGPT: Simplifying Complex Topics, Resource Preparation, Improving Writing, Coding Skills, Project Guidance, Applications of Grammarly: Grammar, Punctuation, Style Checks, Plagiarism Detection, Improving Professional Communication.

Language and Accessibility Tools

Role of Google Input Tool: Multilingual Typing and Accessibility in Communication, Application in Regional Communication for Business Documents and Emails.

Presentation and Content Creation Tools

Overview of Slides AI: AI-Generated Slides, Layout Suggestions, Content Creation for Presentations, Use of Synthesia for Video Content Creation: Developing Training, Marketing, Educational Materials.

MODULE 2: Writing, Editing, and Content Refinement Tools

Writing and Paraphrasing Tools

Introduction to Quillbot: Grammar Checking, Paraphrasing, Content Enhancement for Business Writing, Importance of Clear and Concise Communication in Business Contexts.

Collaborative Editing Tools

Using Microsoft Word's Track Changes Feature: Tracking Edits, Suggesting Improvements, Facilitating Collaboration.

MODULE 3: Interview and Career Preparation

Mock Interview Tools

Overview of Interview Buddy: Personalized Interview Questions, Practice Sessions, Career Goal Alignment, Role in HR Management and Recruitment Preparation.

MODULE 4: Productivity and Project Management Tools

Project Collaboration Platforms

Introduction to ClickUp: Features Like Task Lists, Calendars, Dashboards, Workflow Organization, Importance in Team Management and Efficiency Improvement in Business Projects.

MODULE 5: Emerging Trends in Digital Business Tools

Integrating AI in Business Operations

Role of Tools like ChatGPT, SlidesAI, and Synthesia in Modern Business Operations. Case Studies on their use in Marketing, HR, and Training.

Ethical and Practical Considerations

Privacy Concerns with AI Tools like Grammarly and Synthesia. Ensuring Authenticity and Minimizing Plagiarism with Writing and Paraphrasing Tools.

RECOMMENDED WEBSITES

- Artificial Intelligence and Business Applications by Pradeep Kumar Mallick, Publisher: CRC Press.
- Business Analytics: The Science of Data-Driven Decision Making by U Dinesh Kumar, Publisher: Wiley India.
- Technology Management for Business Innovation by P. K. Suri, Publisher: Springer.
- India AI Superpowers: China, Silicon Valley, and the New World Order" by Kai-Fu Lee, Publisher: Houghton Mifflin Harcourt.
- The Fourth Industrial Revolution" by Klaus Schwab, Publisher: Crown Business.
- The Productivity Project" by Chris Bailey, Publisher: Crown Business.

- Designing Data-Intensive Applications" by Martin Kleppmann, Publisher: O'Reilly Media.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. describe AI-assisted tools, multilingual utilities, and presentation software for enhancing productivity and communication in professional settings.

CO2. demonstrate proficiency in writing and editing tools to refine business communication and collaborative content development.

CO3. employ mock interview platforms to align career objectives with industry requirements and improve recruitment skills.

CO4. integrate advanced project management tools to streamline workflows and optimize team efficiency in organizational projects.

CO5. formulate ethical and practical strategies for leveraging AI-driven tools in business operations while addressing privacy and authenticity concerns.

CO-PO Mapping Matrix											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	-	-	2	-	-	1	2	-	2
CO2	3	3	-	3	2	-	3	1	-	2	2
CO3	3	-	1	1	-	2	-	2	2	3	1
CO4	3	2	-	2	-	-	1	1	2	1	3
CO5	2	1	2	1	3	2	-	2	2	3	2

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ANNEXURE - VI

Syllabus of
Ph.D Programme (course work)
for Batch Admitted in 2024-25

[ITEM CSBM: 7]

Recommended in the Board of Studies Meeting of Centre for CSBM held on 08th December 2024

Centre for Computer Science and Business Management

MARKETING ANALYTICS
70100001

COURSE OBJECTIVES

- To learn to leverage data for informed decision-making in marketing strategies.
- To understand key metrics, tools, and techniques to analyze and optimize marketing performance.
- To gain skills in customer segmentation, predictive analytics, and campaign evaluation.
- To explore advanced topics like AI, big data, and ethical considerations in marketing analytics.

Unit I

Introduction to Marketing Analytics: Definition and Importance of Marketing Analytics, Role of Data in Modern Marketing, Key Metrics and KPIs in Marketing Analytics, Overview of Marketing Analytics Tools and Software, Challenges and Opportunities in Data-Driven Marketing

Unit II

Data Collection and Visualization in Marketing: Sources of Marketing Data: Primary and Secondary Data, Techniques for Data Collection: Surveys, Web Analytics, Social Media Listening, Data Cleaning and Preparation for Analysis, Visualization Techniques: Dashboards, Infographics, and Reports, Tools for Data Visualization: Tableau, Power BI, Google Data Studio.

Unit III

Customer Analytics and Segmentation: Understanding Customer Behavior and Lifetime Value, Market Segmentation Techniques: Demographic, Psychographic, and Behavioral Segmentation, Predictive Analytics for Customer Insights, Personalization Strategies Using Customer Data, Case Studies: Customer Segmentation in Action.

Unit IV

Marketing Mix and Campaign Analytics: Measuring ROI for Marketing Campaigns, Attribution Modeling: Single-Touch and Multi-Touch, Price Optimization Techniques, A/B Testing and Experimentation in Marketing, Evaluating Channel Performance: Digital, Social Media, and Traditional Marketing.

Unit V

Advanced Topics in Marketing Analytics: Big Data Analytics in Marketing, Machine Learning and AI Applications in Marketing, Sentiment Analysis and Text Mining, Ethical Considerations in Marketing Analytics, Future Trends: Predictive and Prescriptive Analytics.

RECOMMENDED BOOKS

1. Marketing Analytics: A Practitioner's Guide to Marketing Analytics and Research Methods by Ashok Charan, World Scientific Publishing Company.
2. Data-Driven Marketing: A Handbook by Navneet Bhushan, Pearson India.
3. Marketing Analytics: Concepts and Applications in Marketing Decisions by S. Krishna, McGraw Hill Education.
4. Marketing Analytics: Strategic Models and Metrics by Stephan Sorger, Createspace Independent Publishing.
5. Competing on Analytics: The New Science of Winning by Thomas H. Davenport and Jeanne G. Harris, Harvard Business Review Press.
6. Marketing Metrics: The Definitive Guide to Measuring Marketing Performance by Paul W. Farris et al., Pearson Education.
7. Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die by Eric Siegel, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. analyze the importance of marketing analytics.

CO2. interpret and apply data collection techniques.

CO3. develop strategies for customer segmentation and personalization by synthesizing predictive analytics and case study insights.

CO4. assess marketing campaigns using advanced ROI measurements, experimentation techniques, and attribution modeling.

CO5. formulate innovative solutions leveraging big data, AI, and ethical frameworks to address complex marketing analytics challenges.

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ANALYTICAL TOOLS
70100003

COURSE OBJECTIVES

- To gain proficiency in applied data analysis processes, data preparation techniques, and using SPSS for descriptive statistics, data transformation, and visualization.
- To explore statistical applications in SPSS, including t-tests, non-parametric tests, and correlation analysis.
- To master multivariate analysis techniques like regression, MANOVA, and discriminant analysis for complex data interpretations.
- To learn advanced data analysis methods, including SEM, time series modeling, and qualitative data analysis.

Unit I

Introduction to Applied Data Analysis & Data Preparation: Applied Data Analysis: Meaning, Significance, And Process, Data Preparation: Testing For Reliability, Validity, And Normality, Identifying And Managing Outliers, SPSS Introduction: SPSS Interface, Preparing Datasets in SPSS, Descriptive Statistics, Cross-Tabulation, and Chart Building, Data Transformation: Split File, Select Cases, Filters, Extension Hub.

Unit II

Basic Statistical Applications in SPSS: Applications In SPSS: T-Test: One-Sample, Independent Sample, Paired Sample, Non-Parametric Tests: Mann Whitney, Wilcoxon Signed Rank, Kruskal Wallis, Correlation: Simple and Partial Correlation.

Unit III

Multivariate Analysis Techniques: Multivariate Analysis: ANOVA and Post Hoc Test, Effect Size Interpretation, Regression Analysis: Simple and Multiple Regression, Multiple Correlation Analysis, Multiple Discriminant Analysis, Multivariate ANOVA (MANOVA), Canonical Correlation Analysis.

Unit IV

Data Analysis Techniques: Advanced Techniques Overview: Cluster Analysis, Dimension Reduction: Factor Analysis And Correspondence Analysis, Conjoint Analysis, Multidimensional Scaling (MDS).

Unit V

Structural Equation Modeling & Time Series Analysis: Structural Equation Modeling (SEM): Concept And Applications, Introduction to AMOS And Smart-PLS, Creating Measurement Models And Structural Models, Path Diagram Analysis, Testing Model Fitness, Time Series Modeling:, Interdependency Testing, General Autoregressive Conditional Heteroscedasticity (GARCH) Model, Autoregressive Moving Average (ARMA) Model, Forecast Values And Confidence Limits, Overview Of Qualitative Data Analysis:, Meaning, Process, And Methods.

RECOMMENDED BOOKS

1. Boslaugh, S. An Intermediate Guide to SPSS Programming: Using Syntax for Data Management. SAGE Publications.
2. Bajpai, N. Business Research Methods. New Delhi: Pearson Publications.
3. Byrne, B. M. (2016). Structural equation modeling with AMOS: Basic concepts, applications, and programming. routledge.
4. Pallant, J. SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSSfor Windows. Allen &Unwin.
5. Hair, J. F., Hult, G. T. M., Ringle, C. M., &Sarstedt, M. (2017). A Primer on PartialLeast Squares Structural Equation Modeling (PLS-SEM) (2 ed.). Thousand Oaks, CA:Sage.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the fundamental concepts of applied data analysis, data preparation techniques, and SPSS functionalities for data handling.

CO2. apply statistical techniques such as t-tests, non-parametric tests, and correlation analysis in SPSS for data-driven decision-making.

CO3. analyze complex datasets using multivariate methods like ANOVA, regression, and MANOVA to interpret relationships and trends.

CO4. evaluate advanced data analysis methods such as cluster analysis, factor analysis, and multidimensional scaling for practical applications.

CO5. design structural equation models and time series models using AMOS, Smart-PLS, and GARCH/ARMA techniques to address real-world problems.

Centre for Computer Science and Business Management

TALENT ACQUISITION AND MANAGEMENT
70100005

COURSE OBJECTIVES

- To equip students with the knowledge of key concepts, principles, and practices in talent acquisition, management, and employee engagement to nurture leadership and organizational success.
- To analyze and apply global talent management drivers, competencies, and models to address challenges in talent development, mobility, and retention in a diverse and dynamic workforce.
- To foster skills to utilize tools like psychometric tests, big data, and talent analytics to create sustainable talent strategies, enhance employee experience, and drive organizational excellence.

Unit I

Foundations of Talent Acquisition and Management: Introduction to Talent Acquisition & Management: Nurturing the Leaders of Tomorrow, Talent Acquisition Practices –Infosys, FedEx, IBM, Google, Introduction to psychometric test, Six Principle of Talent Management, Employee Engagement, Employee Brand, Employee Retention.

Unit II

Integrated Talent Management Processes and Global Perspectives: Integrated Talent Management Process, Global Talent Management drivers, Global Leadership Competencies, Talent Management Challenges, Talent Development, Talent Enhancement, Talent Mobility, and Rewards in Talent Management.

Unit III

Talent Management Models and Analytical Approaches: Integrated Talent Management Models, Zinger Model, Reward Strategy for Talent Management, Coaching and Development, Talent Development, Talent Analytics, Meta -Analysis - Talent Analytics.

Unit IV

Technology and Strategic Tools in Talent Management: Organization Cultural, Coaching with Compassion, Talent Success Drivers, Talent Acquisition Strategy.

Talent Management Pepsi Co, Automated Screening Talent Analytics, Big Data Talent Analytics.

Unit V

Evolving Trends and Critical Issues in Talent Management: Management In The New Economy, Employment to Consultation, Embedding & Sustaining Talent Power, Talent Enhancement & Drivers Of Success, Building Sustainable Talent Through Talent Management, Talent Powered Organization, Critical Issues In Talent Management, Feeling And Sentiments Analysis.

RECOMMENDED BOOKS

1. Talent Management Handbook (2017) by Lance A. Berger & Dorothy R. Berger, Association for Talent Development (ATD), Virginia, USA.
2. The Talent Management Handbook (Second Edition): Creating a Sustainable Competitive Advantage by Selecting, Developing, and Promoting the Best People by Lance A. Berger & Dorothy R. Berger, McGraw-Hill Education.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain talent management practices in India and Global level.

CO2. analyze global talent management drivers, challenges and competencies, and propose strategies for talent mobility, enhancement, and rewards.

CO3. evaluate integrated talent management models and develop reward strategies and talent analytics for workforce optimization.

CO4. critically assess advanced tools such as automated screening and big data analytics in talent acquisition, with case studies on organizations.

CO5. examine the transition from traditional employment to consultancy models, embedding sustainable talent strategies, and addressing critical issues like sentiment analysis.

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DESIGNING WORK ORGANIZATION
70100006

COURSE OBJECTIVES

- To equip with relevant analytical skills to apply their theoretical understanding of organizational design and change to understand organization design challenges in practice.
- To analyze the range of contextual determinants of organizational effectiveness;
- To maneuver various design elements (structure, system, process, and culture) to enhance organizational effectiveness and efficiency.

Unit I

Introduction to Organizational Design: Evolution of Organization Theory & Design, Approaches to Design based on Different Models, Role of Strategy in Organization Design, A Framework for selecting strategy and design.

Unit II

Assessing Organizational Effectiveness: Inter Organizational Relationship Designing Organizations for Competitive Success, Design Elements, Organization Resilience and Adaptability, Organization Decision-Making, Models of Organizational Decision-Making, Contingency Decision-Making Framework, and Role of IT in Decision Making.

Unit III

Organizational Change and Decision Making: Strategic Role of Change, Model of Change Management, Managing Technology Change, leading in VUCA World, Enhancing Organizational Readiness for Change, Interdepartmental Conflict in Organization, Power and Organization, Political Processes in an organization, Communications Structure of Organization, Contingency decision-making frameworks, Organizational resilience and adaptability.

Unit IV

Culture and Innovation in Organization Design: Developing and Managing Organizational Culture, Innovation Management and Design Thinking, Organizational Learning and Ethical Considerations, Organizational Design

Challenges, Understanding Global Organizational Design, Designing Structure to Fit Global Strategy, Building Global Capabilities, The Workplace And Spirituality.

Unit V

Global and Sustainable Organizational Design: Designing organizations for global effectiveness, Sustainable organizational design, Employee engagement and meaningful workplace experiences, Workplace Design for Well-being, Organization Building in Context Employee Engagement, The Experience-Centric Organization, The Wheel of Experience Centricity, Designing Organization for Meaningful Experiences.

RECOMMENDED BOOKS

1. Understanding the Theory and Design of Organizations (11th Edition) by Richard L. Daft and Nishant Uppal, Cengage Learning
2. Designing Dynamic Organizations: A Hands-On Guide for Leaders at All Levels by Jay Galbraith, Diane Downey, Amy Kates, AMACOM

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the fundamental principles of organizational design and assess the role of structure and strategy in shaping organizational effectiveness.

CO2. apply frameworks for assessing organizational structure and performance, and align design elements to enhance overall organizational effectiveness.

CO3. utilize decision-making models and manage organizational change, ensuring design flexibility in a dynamic environment.

CO4. apply organizational culture and innovation on design to improve workplace environments and organizational practices. to maneuver various design elements.

CO5. analyze and design organizations that are adaptable to global influences and promote sustainable practices, enhancing long-term organizational success.

Centre for Computer Science and Business Management

DIGITAL MARKETING
30241107

COURSE OBJECTIVES

- To understand the evolution of digital marketing and its key strategies, including inbound and outbound marketing.
- To develop skills in social media marketing, content creation, and campaign analytics.
- To master PPC advertising, email marketing, and campaign optimization techniques.
- To analyze marketing data, visualize performance metrics, and explore future trends like AI and influencer marketing.

Unit I

Fundamentals of Digital Marketing: Introduction To Digital Marketing: Definition, Scope, and Evolution, Key Differences between Traditional and Digital Marketing, Digital Marketing Platforms and Tools Overview, Consumer Behavior In The Digital Era, Importance Of Inbound And Outbound Marketing Strategies.

Unit II

Social Media And Content Marketing: Social Media Marketing: Strategies for Platforms Like Facebook, Instagram, Linkedin, and Twitter, Creating Effective Social Media Campaigns, Importance of Storytelling in Content Marketing, Content Creation, Curation, and Optimization, Social Media Analytics And Tools for Performance Measurement.

Unit III

Paid Advertising and Email Marketing: Pay-Per-Click (PPC) Advertising: Google Ads, Facebook Ads, Campaign Creation, Bidding Strategies, and A/B Testing, Email Marketing: Building Mailing Lists, Crafting Impactful Emails, Marketing Automation Tools and Techniques, Analytics For Paid Campaigns and Email Performance Tracking.

Unit IV

Data Collection, Visualization and Analysis for Marketing Campaigns: Collecting Data from Marketing Channels, Integrating Data from Google Analytics, Social Media, Email Campaigns, Data Cleaning and Preparation, Data Visualization for Digital Marketers: How to Visualize Performance Metrics and Trends, Creating Impactful

Dashboards. Analyzing Website Traffic & User Behavior, Understanding User Flow and Behavior on Websites.

Unit V

Analytics, Trends, and Future of Digital Marketing: Introduction to Web Analytics: Google Analytics And Introduction To Predictive Analytics In Digital Marketing, Measuring Campaign ROI and Performance Metrics, Emerging Trends: AI In Marketing, Voice Search Optimization, and Influencer Marketing, Challenges in Digital Marketing And Ethical Considerations, Career Opportunities and Certifications In Digital Marketing.

RECOMMENDED BOOKS

1. Digital Marketing: Strategies, Implementation, and Practice by Chaffey, D., Publisher: Pearson Education.
2. Digital Marketing for Dummies by Ryan Deiss and Russ Henneberry, Publisher: Wiley.
3. Digital Marketing: A Practical Approach by Nikita Sharma, Publisher: BPB Publications.
4. Social Media Marketing: A Strategic Approach by Kathy J. Macmillan, Publisher: Cengage Learning.
5. Digital Marketing: An Integrated Approach to Online Marketing by S. S. Bedi, Publisher: Pearson India.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. recall the core principles of digital marketing, its evolution, and key differences from traditional marketing.

CO2. implement social media marketing strategies across various platforms, focusing on content creation, optimization, and performance measurement.

CO3. interpret the effectiveness of paid advertising and email campaigns, utilizing tools like A/B testing and analytics.

CO4. critique data from multiple marketing channels, applying visualization techniques to track and measure campaign success.

CO5. forecast emerging trends in digital marketing, including AI, voice search, and predictive analytics, while addressing industry challenges.

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IMAGE PROCESSING & COMPUTER VISION
30100001

COURSE OBJECTIVES

- To acquire knowledge of the fundamentals of image processing, including image representation, digitization, and basic operations like convolution and histogram analysis.
- To learn various preprocessing and transformation techniques for image enhancement, including smoothing, sharpening, and contrast adjustment.
- To understand image restoration and denoising techniques, including different filtering methods and segmentation strategies for effective image analysis.
- To explore object recognition, pattern recognition, and morphological operations to interpret and analyze images effectively.

Unit I

Introduction to Image Processing Systems: Digital Image Fundamentals, Imaging Geometry, Image Model, Types of Image, Image Representation, Image Digitization, Digital Image Properties, 2D Convolution And Correlation, Histogram.

Unit II

Image Preprocessing and Transformations: Image Preprocessing, Images Transformations, Geometric Transformations, Brightness Transformation Image Smoothing, Contrast Stretching, Basic Gray Level Function Neighborhood Averaging, Median Filtering, Low Pass Filters, Average of Multiple Images, Image Sharpening, Histogram Specification, Histogram Equalization.

Unit III

Image Restoration, Denoising, and Segmentation: Image Restoration and Denoising, Image Degradation, Types of Image Blur, Image Denosing, Classification Of Noise In Images, Classification Of Image Restoration Techniques, Image Restoration Models, Gray Level Interpolation, Inverse & Weiner Filter, Performance Metrics In Image Restoration, Image Segmentation, Region Representation, Region Growing, Region Splitting And Merging, Detection Of Discontinuation, Point Detection, Line Detection. Edge Detection, Lines, Curves, Shape Representation, Hough Transform.

Unit IV

Object and Pattern Recognition: Object Recognition, Pattern Recognition, Knowledge Representation, Statistical Pattern Recognition, Classification Principles, Classifier Learning, Neural Nets, Syntactic Pattern Recognition, Recognition as Graph Matching.

Unit V

Mathematical Morphology: Basic Morphological Concepts, Morphological Principles, Binary Dilation and Erosion, Opening, Closing, Properties of Morphological Operation, Boundary Detection, Region Filling, Thinning, Thickening and homotopic Skeleton.

RECOMMENDED BOOKS

1. Digital Image Processing by Gonzalez & Wood
2. Digital Image Processing by A. K. Jain.
3. Digital Image Processing and Computer Vision by Sonka, Hlavac,Boyle
4. Digital Image Processing by S Jayaraman

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define the fundamental concepts Digital Image Processing system.

CO2. evaluate the techniques for image enhancement and restoration.

CO3. analyzing the techniques for image segmentation.

CO4. interpret object detection and pattern recognition techniques.

CO5. develop application using computer vision techniques.

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ANNEXURE - VII

Course for MITS-MOOC Development for B. Tech VII Semester Under Flexible Curriculum

[ITEM CSBM: 7]

Recommended in the Board of Studies Meeting of Centre for CSBM held on 08th December 2024

BIG DATA COMPUTING

COURSE OBJECTIVES

- To provide a comprehensive understanding of Big Data concepts, characteristics, and challenges.
- To introduce Hadoop, Spark, and other Big Data technologies for distributed computing and data processing.
- To enable hands-on learning of frameworks like HDFS, MapReduce, and Spark for real-world problem-solving.
- To familiarize students with advanced topics such as machine learning, predictive analytics, and graph processing in Big Data.
- To equip students with skills for implementing scalable solutions for large datasets and real-time data streaming.

Unit I

Introduction to Big Data and Hadoop Ecosystem: Fundamental concepts of Big Data, Key Characteristics—Volume, Variety, Velocity, and Veracity. Big Data, Associated Challenges, and Enabling Technologies such as Hadoop, NoSQL Databases, and Spark, Overview of the Hadoop Ecosystem, including MapReduce, and YARN.

Unit II

Hadoop Framework and MapReduce: Hadoop Distributed File System (HDFS), its Architecture, Data Blocks, and Fault Tolerance. MapReduce programming: Version 1.0 to 2.0 with YARN and Resource Management. Practical Examples of MapReduce for Real-World Problem-Solving and its Application.

Unit III

Introduction to Spark and Parallel Programming: Introduction to Parallel Data Processing and Parallel Data Processing using Spark. Spark Architecture, Resilient Distributed Datasets (RDDs), Directed Acyclic Graphs (DAGs), and built-in Libraries such as MLlib, GraphX, and Spark Streaming.

Unit IV

Data Placement and Distributed Systems: Introduction to Data Placement Strategies, CAP Theorem, Trade-offs Between Consistency, Availability, and Partition Tolerance in Distributed Systems. Techniques for Achieving Consistency in Distributed Databases, Querying Data using Cassandra Query Language (CQL), and Zookeeper.

Unit V

Streaming Platforms and Analytics: Introduction to the Real-Time Data Processing using Platforms like Spark Streaming and Kafka, Design and Architecture of HBase, Techniques for Sliding Window Analytics, and Messaging Systems in Kafka. K-Means Clustering using MapReduce. Introduction to Machine learning Techniques used in Big Data, Graph-Based Analytics, PageRank Algorithm and Graph Processing using Spark GraphX.

COURSE OUTCOMES

After completion of the course, students will be able to:

CO1. explain the fundamental concepts and challenges of Big Data.

CO2. discuss the basic concepts of Hadoop ecosystems, including HDFS, MapReduce, and YARN, for distributed data processing.

CO3. compare Spark's data processing approach with other parallel processing frameworks.

CO4. perform real-time streaming analytics and manage data in distributed systems.

CO5. analyse the comparison among the scalable machine learning models and predictive analytics for Big Data.
