Jagannath University

MINUTES OF THE BOARD OF STUDIES,

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ENGINEERING & TECHNOLOGY

DATE	:	**August 17, 2023**
TIME	:	**02:30 PM**
VENUE	:	**UNIVERSITY CONFERENCE ROOM SITAPURA CAMPUS, JAIPUR**

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Jagan Nath University
Jaipur

Jagannath University

INDEX OF THE MINUTES OF MEETING

THE BOARD OF STUDIES, DEPARTMENT OF ENGINEERING & TECHNOLOGY,

JAGAN NATH UNIVERSITY, JAIPUR

HELD ON August 17, 2023 AT 02:30 PM

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MINUTES OF THE MEETING

BOARD OF STUDIES, DEPARTMENT OF ENGINEERING & TECHNOLOGY

JAGAN NATH UNIVERSITY, JAIPUR

The 31th meeting of the Board of Studies of Faculty of Engineering & Technology, Jagan Nath University, Jaipur, was held on **August 17, 2023** at 02:30 pm in the University Conference Room, Jagan Nath University, Sitapura Campus.

The following members are attended the meeting:

1.	Prof. (Dr.) Vivek Kumar Sharma (Dean, Faculty of Engineering & Technology)	:Convener
2.	Dr. Ramesh Bharti (HOD, Department of Engineering & Technology)	:Member
3.	Dr. Renu Bagoria, Professor	:Member
4.	Dr. Amit Kumar Saraf, Associate Professor	:Member
5.	Prof (Dr.) Om Prakash Sharma, Pro-Vice Chancellor	:Member
6.	Mr. Hemant Agarwal, Asst. Professor	:Member
7.	Prof. (Dr.)Vivek Kumar (Vice- Chancellor, Quantum University, Roorkee)	:Expert from Academia (Member)
8.	Prof. (Dr.) M.P. Singh (Professor, JECRC, Jaipur,)	:Expert from Academia(Member)
9.	Mr. Ashish Malik (Director, Softhunters Technology Pvt Ltd, Jaipur)	:Expert from Industry(Member)
10.	Mr. N.K. Agrawal (Executive Engineer, Nagar Nigam Jaipur,)	:Expert from Industry (Member)
11.	Mr. Alok Dixit (Vice President, Citycorp Services India Pvt Ltd)	:Expert from Industry (Member)
12.	Ms. Deepika Agrawal (Project Leader, Sopra Banking Softwares, Noida)	:Alumni Representative
13.	Mr. Nishat Saini (Senior Production Engineer, Leo The Vinci, Jaipur)	:Alumni Representative
14.	Mr. Tanmay Pattnayak, Registrar	:President's Nominee

[Dr. Vivek Kumar, Expert from Academia, Mr. N.K. Agrawal, Experts from Industry, could not attend the meeting].

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At the onset, the Convener, Board of Studies welcomed and thanked all the members experts for sparing their valuable time for attending the meeting of the Board of Study of the Faculty of Engineering & Technology.

Thereafter, the following items on agenda were taken up for consideration:

Item No. 31.01: To confirm the minutes of the 30th meeting of the Board of Studies held on February 21, 2023.

Resolution: The Minutes of the 30th Meeting of the Board of Studies were circulated amongst the members. No observations have been received.

The Minutes of the Meeting of the BOS held on **February 21, 2023** were confirmed. **(Annexure 31.01)**

Item No. 31.02: To review the Action Taken Report of the Minutes of the Meeting of the Board of Studies held on February 21, 2023

Resolution: Keeping in the view the suggestions received from members of Board of Studies. The board apprised Action Taken by the Department. Action taken report is attached here with this report. **(Annexure 31.02)**

Item No. 31.03: To consider and approve the syllabi of various programs of odd Semester 2023-24.

Resolution:

(i) The BOS considered and approved the changes in scheme of the Engineering Physics & Engineering Chemistry courses in B. Tech I & II Semester (Batch 2023-27 & onwards). Half of the Students of the Intake will study Engineering Physics and rest half of the students will study Engineering Chemistry courses.

(ii) Keeping in view of the AICTE's model curriculum, the BOS considered and approved the changes in scheme & syllabi of Engineering Mathematics Courses in B.Tech. I, II, III & IV Semester (Batch:2022-26, 2023-27 & onwards).

(iii) The BOS considered and approved the changes in scheme & syllabi in MCA I-Semester (Batch 2023-25 & onwards).

(iv) The BOS considered and approved the changes in scheme in BCA I & II Semester (Batch 2023-26 & onwards).

(v) The BOS considered and approved the changes in scheme & syllabi of B.Tech III – Semester Computer Science Engineering specialization – Data Science, AI & ML (Batch 2022-26)

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(vi) The BOS considered and approved the changes in scheme & syllabi of B.Tech III- Semester Civil, Mechanical, Agriculture (Batch 2022-26).**(Annexure 31.03)**

Item No. 31.04: To review the status of Enrollment in MOOCs.

Resolution: The BOS considered the status of Enrollment in MOOCs. To encourage the participation of the students in the MOOc's courses, the board recommends to reimburse the Examination fees of Faculty and Students if they will submit a document of passing in the MOOC course.

Item No. 31.05: To consider and approve the Value Added courses in upcoming semester.

Resolution: The BOS considered and approved the Couple of Value Added courses/Add on Courses to be offered for upcoming Semester in the academic session 2023-24:

Item No. 31.06: To consider and approve the departmental Academic Calendar.

Resolution: The BOS considered and approved the departmental Academic Calendar for upcoming odd semester in the academic session 2023-24.**(Annexure 31.06)**

Item No. 31.07: To discuss the outcome/ status of previous semester Slow and Advance Learner in all the programs.

Resolution: The BOS considered the outcome/ status of previous semester Slow and Advance Learner of the department and resolved to work on the slow learners rigorously.

Item No. 31.08: To review the progress of Mentor Mentee program.

Resolution: The BOS considered and reviewed progress of Mentor-Mentee program of the department and resolved to implement the Mentor- Mentee program more religiously and rigorously.

Item No. 31.9 To discuss the status and future plan of collaboration with industry for industry interaction and trainings.

Resolution: The BOS recommends to form a Departmental committee that will work for collaboration with industry for industry interaction and trainings along with the Training & Placement Cell of the University.

Item No. 31.10: To apprise activities organized by Faculty / Department of Engineering & Technology during the last semester.

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Resolution: The BOS reviewed and apprised activities conducted by the Department as per Academic Calendar and resolved to conduct more activities for the development of students and faculty members. **(Annexure 31.10)**

Item No. 31.11: To note the participation of teachers in conferences/seminars and publication of Research papers in UGC Care listed Journals.

Resolution: The BOS reviewed the activities/participation of teachers in conferences/seminars and their research publications and resolved to encourage more quality research publications through incentive schemes of the university. **(Annexure 31.11)**

Item No. 31.12: To discuss the Training & Placement activities plan for internships and placement lined up in the department.

Resolution: The BOS reviewed the Training & Placement activities plan for internships and placement lined up in the department.

Item No. 31.13: Any other item with the permission of the chair.

Resolution: No issue was raised.

The meeting ended with vote of thanks to Chair.

Dr. Vivek Kumar Sharma
Dean, Department of Engineering & Technology

Dr. Ramesh Bharti
Head of Department

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JAIPUR

ACTION TAKEN REPORT ON THE RESOLUTIONS TAKEN IN THE BOARD OF STUDIES, FACULTY OF ENGINEERING & TECHNOLOGY DEPARTMENT OF ENGINEERING & TECHNOLOGY HELD ON August 17, 2023

The following is the agenda-wise action taken report on the resolutions taken in 31th meeting of the Board of Studies of Faculty of Engineering & Technology, Jagan Nath University, Jaipur, held on August 17, 2023 at 02:30 pm in the University.

Item No. 31.01: To confirm the minutes of the previous meeting of the Board of Studies held on February 21, 2023.

Action Taken: The minutes of last meeting of board of studies was circulated in advance. As there was no observation raised, hence it is confirmed.

Item No. 31.02: To review the Action Taken Report of the Minutes of the Meeting of the Board of Studies held on February 21, 2023.

Action Taken: The resolutions taken in the meeting of the Board of Studies held on February 21, 2023were implemented.

Item No. 31.03: To consider and approve the syllabi of various programs of odd Semester 2023-24.

Action Taken: All revised schemes and syllabi of various programs resolved in the BOS meeting, were implemented in the odd semester 2023-24.Anandam courses were removed from all B.Tech., M.Tech., BCA, MCA and Diploma programs.

Item No. 31.04: To review the status of Enrollment in MOOCs.

Action Taken: The list of MOOC's courses finalized in the BOS has been floated/offered to the students. Students were encouraged to participated in the MOOC's courses. Some students have enrolled in MOOC's courses

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Item No. 30.12: To discuss the framework of UG programs as per the UGC scheme - Curricular Framework and Credit System for the Four Year Undergraduate Program for Academic Session 2023-24.

Action Taken: A Departmental committee was formed and work for reviewing the framework of UG programs as per the UGC scheme - Curricular Framework and Credit System for the Four Year Undergraduate Program for Academic Session 2023-24 was initiated.

Item No. 30.13: To apprise activities organized by Faculty / Department of Engineering & Technology during the last semester.

Action Taken: Reports of the activities were submitted to IQAC.

Item No. 30.14: To note the participation of teachers in conferences/seminars and publication of Research papers in UGC Care listed Journals.

Action Taken: Details of the publications of the faculty member were reported to IQAC for its perusal.

Item No. 30.15: To discuss the Training & Placement activities plan for internships and placement lined up in the department.

Action Taken: Departmental committee for Training & Placement activities was asked to conduct more activities.

Item No. 30.16: Any other item with the permission of the chair.

Action Taken: The revised syllabi of B. Tech VII semester Elelctrical Engineering, B. Tech VII semester Civil Engineering, B. Tech VII semester Computer Engineering syllabus of Academic Session 2019-23 were implemented.

Dr. Vivek Kumar Sharma
Dean, Department of Engineering & Technology

Dr. Ramesh Bhatt

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Jagannath University

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MINUTES OF THE BOARD OF STUDIES,

FACULTY OF ENGINEERING & TECHNOLOGY

DATE	:	**10th February 2024**
TIME	:	**02:30 PM**
VENUE	:	**UNIVERSITY CONFERENCE ROOM SITAPURA CAMPUS, JAIPUR**

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INDEX OF THE MINUTES OF

THE BOARD OF STUDIES, FACULTY OF ENGINEERING & TECHNOLOGY, JAGAN NATH UNIVERSITY, JAIPUR

HELD ON 10TH FEBRUARY 2024 AT 02:30 PM

10.02.2024

(Prof. (Dr.) Om Prakash Sharma)
Dean Faculty of Engineering and Technology

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Jaipur | Rajasthan

Faculty of Engineering and Technology
Board of Studies Meeting

Date:08.02.2024

Notice

The 32nd meeting of Board of Studies will be held on 10.02.2024 at 2.00pm in the Conference Room (E-001), E-Block, Sitapura Campus, Jagannath University, Jaipur. All the members are requested to kindly attend the same:

The agenda of the meeting is as follows:

32.1 To confirm the minutes of the previous meeting of the Board of Studies held on 17th Aug. 2023.
32.2 To review the Action Taken Report of the Minutes of the Meeting of the Board of Studies held on 17th Aug. 2023.
32.3 To consider and approve the New Courses added in the syllabi.
32.4 To consider and approve the revision in the course content.
32.5 To review the implementation of integration of research component in UG programs.
32.6 To consider and approve the Value Added courses in upcoming semester.
32.7 To consider and approve the syllabi of B Tech and Diploma (CSE/EE/ME/CE), BCA, MCA programs for Even Semester 2023-24.
32.8 To review the status of Enrollment in MOOCs.
32.9 To consider and approve the departmental Academic Calendar.
32.10 To discuss the outcome/ status of previous semester Slow and Advance Learner in all the programs.
32.11 To review the progress of Mentor Mentee program.
32.12 To consider and approve the new programs to be introduced in the Academic Session 2024-25.
32.13 To review the status and future plan of collaboration with industry for internships / trainings / projects.
32.14 To apprise activities organized by Faculty of Engineering and Technology during the last odd semester.
32.15 To note the participation of teachers in conferences/seminars and publication of Research papers in UGC Care listed Journals.
32.16 To discuss the Training & Placement activities plan for internships and placement lined up in the department.
32.17 Any other item with the permission of the chair.

08/02/2024

Prof. (Dr.) Om Prakash Sharma)
Dean Faculty of Engineering and Technology

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MINUTES OF THE
BOARD OF STUDIES, DEPARTMENT OF ENGINEERING & TECHNOLOGY
JAGAN NATH UNIVERSITY, JAIPUR

The 32nd meeting of the Board of Studies of Faculty of Engineering & Technology, Jagan Nath University, Jaipur, was held on 10TH February 2024 at 02:30 pm in the University Conference Room, Jagan Nath University, Sitapura Campus.

The following members attended the meeting:

1). Prof. (Dr.) Om Prakash Sharma (Dean FoET) : Convener
2). Prof. (Dr.) Vivek Kr. Sharma, Professor : Members
3). Prof. (Dr.) Ramesh Bharti, Professor EE : Member
4). Prof. (Dr.) Renu Bagoria, Professor CSE : Member
5). Dr. Amit Kumar Saraf, Associate Professor ME : Member
6). Mr. Hemant Kr. Agarwal, Assistant Professor CE : Member
7). Dr. Hukum Saini Associate Professor Comp. App. : Member
8). Prof. (Dr.) Ritu Vijay, Professor Dean Banasthali Vidhyapith (EE/ECE): Expert from Academia
9). Dr. Madhavi Sinha, Associate Professor, BIT Mesra, Jaipur (CSE/CA) : Expert from Academia
10). Prof. (Dr.) Mayank Varshney, Ex Principal, VIT, Jaipur (Civil/ME) : Expert from Academia
11). Mr. Sankalp Gupta, Director Technos Inst. and Center of Excellence : Expert from Industry
12). Ms. Deepika Agarwal Project Leader, Sopra Banking Softwares, Noida:Alumni Representative
13). Ms. Ritika Middha, Project consultant, Online System : Alumni Representative
14). Dr. Mayank Mathur, Dy. Registrar : Special Invitee
15). Mr. Avinash Nath Tiwari, TIC ME : Special Invitee
16. Dr. Anil Sharma, Dean Academics : Special Invitee
17. Ms. S. N Sana, Head Training and Placement : Special Invitee

Due to unavoidable reasons Dr. Vaishali Sharma, Dean FoMS, could not attend the meeting.

At the outset, Prof. (Dr.) Om Prakash Sharma (Dean FoET), the Convener, Board of Studies welcomed and thanked all the members & experts of the new BoS committee formed as per the Office Order Ref. No.:JU/Regr./2023-24/7496 dated 8th Feb 2024, for sparing their valuable time for attending the meeting of the Board of Study of the Faculty of Engineering & Technology.

On behalf of the Management and FoET Prof. (Dr.) Om Prakash Sharma conveyed special gratitude to all

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After brief self introduction of all the members, expects and special invitee, the following items on agenda were taken up for consideration:

Item No. 32.1: To confirm the minutes of the previous meeting of the Board of Studies held on 17th Aug. 2023.

Resolution: The Minutes of the 31st Meeting of the Board of Studies were circulated amongst the members. No observations have been received. The Minutes of the Meeting of the BOS held on 17th August 2023 were confirmed. **(Annexure 32.1)**

Item No. 32.2: To review the Action Taken Report of the Minutes of the Meeting of the Board of Studies held on 17th August 2023.

Resolution: Keeping in the view the suggestions received from members of Board of Studies. The board apprised Action Taken by the Department. Action taken report is attached here with this report. **(Annexure 32.2)**

Item No. 32.3: To consider and approve the New Courses added in the syllabi.

Item No. 32.4: To consider and approve the revision in the course content.

Resolution: Academic Experts and Members as per the following Group A/B/C jointly observed the scheme and the syllabus

Group A (B Tech CSE, BCA, MCA and Diploma): Dr. Madhavi Sinha, Associate Professor, BIT Mesra, Jaipur, Dr. Renu Bagoria, Professor CSE and Dr. Hukum Saini, Associate Professor

Group B (B Tech EE/ECE and Diploma): Dr. Ritu Vijay, Professor & Dean Banasthali Vidhyapith, Dr. Om Prakash Sharma Professor ECE/EE and Dr. Ramesh Bharti, Professor ECE/EE

Group C (B Tech ME/CE and Diploma ME/CS): Prof. (Dr.) Mayank Varshney, Ex Principal, VIT, Jaipur Dr. Amit Kumar Saraf, Associate Professor ME Mr. Hemant Kr. Agarwal, Assistant Professor CE. Valuable suggestions and inputs are as follows;

(i) The BOS considered and approved the changes in scheme of the Engineering Physics & Engineering Chemistry courses in B. Tech I & II Semester (Batch 2023-27 & onwards). Half of the Students of the Intake will study Engineering Physics and rest half of the students will study Engineering Chemistry courses.

(ii) Keeping in view of the AICTE's model curriculum, the BOS considered and approved the changes in scheme & syllabi of Engineering Mathematics Courses in B.Tech. I, II, III & IV Semester (Batch:2022-26, 2023-27 & onwards).

(iii) The BOS considered and approved the changes in scheme & syllabi in MCA I- Semester (Batch 2023-25 & onwards).

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(iv) The BOS considered and approved the changes in scheme in BCA I & II Semester (Batch 2023-26 & onwards).

(v) The BOS considered and approved the changes in scheme & syllabi of B.Tech III – Semester Computer Science Engineering specialization – Data Science, AI & ML (Batch 2022-26)

(vi) The BOS considered and approved the changes in scheme & syllabi of B.Tech III-Semester Civil, Mechanical, Agriculture (Batch 2022-26).

(vii) Suggestions in B Tech/M Tech/ Diploma ME_CE (Dr Mayank Varshney): Credit should be more in projects, Seminar should be included in IV semester, Number of lectures should be decreased from 2 hrs to 1 hrs of audit courses, Number of lectures for Research Methodology should be decreased from 3hrs to 2hrs., Software courses should be added in final year of both B Tech ME & CE such as MINITAB, Solid Works, CATIA etc.

(viii) Suggestions in B Tech/M Tech/ Diploma/MCA/BCA (Dr. Madhavi Sinha): Emphasized internship placement in the second semester for BCA students, in accordance with NEP guidelines, Propose scheduling DSA (Data Structures and Algorithms) immediately after programming subjects in the second semester, VAC (Value Added Courses) to include Yoga/Sports excluding theoretical subjects, Restructuring BCA code 805 to focus on Project & Thesis writing with a distinctive dissertation component, Suggest integrating advanced subjects like AI/ML/Networking into the final year semester of Honour BCA, Practical subjects to be given higher credit weight age compared to theory subjects, Reduction of hours allocated to non-technical subjects, Recommend establishing prerequisite subjects (BTECH 703A,B,C) for BTECH streams (606A,B,C) to enhance continuity and coherence in learning, Propose offering SPM (Software Project Management) as a reading elective or MOOC course in the fourth semester of MCA, Bridge courses in MCA to be treated as Non Passing or non-creditable and separate mark sheets to be provided,

(ix) Suggestions in B Tech/M Tech/ Diploma EE (Dr. RITU VIJAY): Seminar and Project Components should be Completed by the end of VI Semester in place of VII and VIII semester, Expert Suggested more Language courses as per Open Elective Components, Syllabus Should Includes some reading Elective Subjects in VII and VIII Semester.

Item No. 32.5: To review the implementation of integration of research component in UG programs.

Resolution: The BOS considered the status of the implementation of integration of research component in UG programs. **(Annexure: 32.5)**

Item No. 32.6: To consider and approve the Value Added courses in upcoming semester.

Resolution: The BOS considered and approved the Couple of Value Added courses/Add on Courses to be offered for upcoming Semester in the academic session 2023-24 **(Annexure: 32.6)**

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Item No. 32.7: To consider and approve the syllabi of B Tech and Diploma (CSE/EE/ME/CE), BCA, MCA programs for Even Semester 2023-24.

Item No. 32.8: To review the status of Enrollment in MOOCs

Resolution: All the members of the BOS appreciated the large numbers of students registered for the MOOC courses. Convener informed the house that management is ready to reimburse the Examination fees of Faculty and Students if they submit the documents/Proof of passing in the MOOC course. **(Annexure 32.8).**

Item No. 32.9: To consider and approve the departmental Academic Calendar.

Resolution: The BOS considered and approved the departmental Academic Calendar for upcoming odd semester in the academic session 2023-24 **(Annexure 32.9).**

Item No. 32.10: To discuss the outcome/ status of previous semester Slow and Advance Learner in all the programs.

Resolution: The BOS considered the outcome/ status of previous semester Slow and Advance Learner of the department and resolved to work on the slow learners rigorously **(Annexure 32.10).**

Item No. 32.11: To review the progress of Mentor Mentee program.

Resolution: The BOS considered and reviewed progress of Mentor-Mentee program of the department and resolved to implement the Mentor-Mentee program more religiously and rigorously.

Item No. 32.12: To consider and approve the new programs to be introduced in the Academic Session 2024-25.

Resolution: The members present appreciated the syllabus and scheme of Data Science. The members suggested to start B Tech Electronics and Communication in near future if possible.

Item No. 32.13: To review the status and future plan of collaboration with industry for internships / trainings / projects.

Resolution: The members present appreciated the MOUs of Ultra Tech, Veteran India Limited and Bajaj Engineering Skills Training (BEST) Center Banasthali Vidhapith. The BOS recommends to form a Departmental committee that will work for collaboration with industry for industry interaction and trainings along with the Training & Placement Cell of the University.

Item No. 32.14: To apprise activities organized by Faculty of Engineering and Technology during the last odd semester.

Resolution: The BOS reviewed and apprised activities conducted by the Department as per Academic Calendar and resolved to conduct more activities for the development of students and faculty members. **(Annexure 32.14)**

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Item No. 32.15: To note the participation of teachers in conferences/seminars and publication of Research papers in UGC Care listed Journals.

Resolution: The BOS reviewed the activities/participation of teachers in conferences/seminars and their research publications and resolved to encourage more quality research publications through incentive schemes of the university. **(Annexure 32.15)**

Item No. 32.16: To discuss the Training & Placement activities plan for internships and placement lined up in the department.

Resolution: The BOS reviewed the Training & Placement activities plan for internships and placement lined up in the department **(Annexure 32.16)**

Item No. 32.17: Any other item with the permission of the chair.

Resolution: No issue was raised.

The meeting ended with vote of thanks to the Chair.

10.02.2024

Prof. (Dr.) Om Prakash Sharma
Dean, Faculty of Engineering & Technology.

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Semester–III

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSBSC301	Discrete Mathematics Structure	BSC	30	70	100	3	-	-	3
BTCSPCC302	Object Oriented Programming	PCC	30	70	100	3	-	-	3
[redacted]	[redacted]	PCC	30	70	100	3	-	-	3
BTCSPCC304	Data Structures and Algorithms	PCC	30	70	100	3	-	-	3
BTCSPCC305	Internet & Web Technology	PCC	30	70	100	3	-	-	3
BTCSPCC306	Software Engineering	PCC	30	70	100	3	-	-	3
PRACTICALS/ VIVA VOCE		**Type**	**Internal Marks**	**External Marks**	**Total**	**L**	**T**	**P**	**Credits**
BTCSPCC307	Data Structures and Algorithms Lab	LC	30	20	50	-	-	1	1
BTCSPCC308	Object Oriented Programming Lab	LC	30	20	50	-	-	1	1
BTCSPCC309	Software Engineering Lab	LC	30	20	50	-	-	1	1
[redacted]	[redacted]	LC	30	20	50	-	-	1	1
BTCSPCC311	Internet & Web Technology Lab	LC	30	20	50	-	-	1	1
BTCSPROJ 312	Industrial Training/Seminar	PROJ	30	20	50	-	-	1	1
BTCSHSMC313	Social Outreach, Discipline & Extra Curricular Activities	HSMC	50		50	-	-	-	1
BTHSMC314	ANANDAM	AECC	**50**	**50**	100	**1**	-	**1**	**2**
	TOTAL		**460**	**590**	**1050**	**19**	**0**	**6**	**27**

Semester –V

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSPCCAIML501	Machine Learning-II	Core	30	70	100	3	-	-	3
BTCSPCCAIML502	Deep Learning	Core	30	70	100	3	-	-	3
BTCSPCC503	Operating System	Core	30	70	100	3	-	-	3
BTCSPCC504	Computer Graphics & Multimedia	Core	30	70	100	3	-	-	3
BTCSPCC505	Analysis of Algorithms	Core	30	70	100	3	-	-	3
BTCSPEC 506A	Software Project Management	Elective	30	70	100	3	-	-	3
BTCSPEC 506B	Human Computer Interaction	Elective	30	70	100	3	-	-	3
BTCSPEC 506C	Bio-informatics	Elective	30	70	100	3	-	-	3
BTHSMC 507	Professional Skills	HSMC	30	70	100	2	-		2
PRACTICALS/ VIVA VOCE		**Type**	**Internal Marks**	**External Marks**	**Total**	**L**	**T**	**P**	**Credits**
BTCSPCCAIML508	Machine Learning-II Lab	Core	30	20	50	-	-	1	1
BTCSPCC509	Computer Graphics & Multimedia Lab	Core	30	20	50	-	-	1	1
BTCSPCC 510	Analysis of Algorithms Lab	Core	30	20	50	-	-	1	1
BTCSPCCAIML511	Deep Learning Lab	Core	30	20	50	-	-	1	1
BTCSPROJ 512	Industrial Training/Seminar	PROJ	30	20	50	-	-	1	1
BTCSHSMC 513	Social Outreach, Discipline & Extra Curricular Activities	HSMC	50		50				1
BTHSMC514	ANANDAM	AECC	**50**	**50**	100	**1**	-	**1**	**2**
	TOTAL		**460**	**640**	**1100**	**21**	**0**	**6**	**28**

Semester-IV

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
[redacted]	[redacted]	Core	30	70	100	3	1	-	4
[redacted]	[redacted]	Core	30	70	100	3	-	-	3
[redacted]	[redacted]	Core	30	70	100	2	-	-	2
BTCSPCC404	Database Management System	Core	30	70	100	3	-	-	3
BTCSPCC405	Theory of Computation	Core	30	70	100	3	1	-	4
BTCSPCC406	Data Communication and Computer Networks	Core	30	70	100	3	-	-	3
PRACTICALS/ VIVA VOCE		Type	Internal Marks	External Marks	Total	L	T	P	Credits
[redacted] 407	[redacted]	Core	30	20	50	-	-	1	1
BTCSPCC 408	Database Management System Lab	Core	30	20	50	-	-	1	1
BTCSPCC 409	Network Programming Lab	Core	30	20	50	-	-	1	1
BTCSPCC410	Linux Shell Programming Lab	Core	30	20	50	-	-	1	1
BTCSPCC411	Java Lab	Core	30	20	50	-	-	1	1
BTCSSODECA 412	Social Outreach, Discipline & Extra Curricular Activities		50		50	-	-		1
BTBSCC413	ANANDAM	AECC	**50**	**50**	100	**1**	-	**1**	**2**
	TOTAL		**430**	**570**	**1000**	**18**	**2**	**6**	**27**

Semester–III

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSBSC301	Discrete Mathematics Structure	BSC	30	70	100	3	-	-	3
BTCSPCC302	Object Oriented Programming	PCC	30	70	100	3	-	-	3
BTCSPCCAIML303	Python Programming	PCC	30	70	100	3	-	-	3
BTCSPCC304	Data Structures and Algorithms	PCC	30	70	100	3	-	-	3
BTCSPCC305	Internet & Web Technology	PCC	30	70	100	3	-	-	3
BTCSPCC306	Software Engineering	PCC	30	70	100	3	-	-	3
PRACTICALS/ VIVA VOCE		**Type**	**Internal Marks**	**External Marks**	**Total**	**L**	**T**	**P**	**Credits**
BTCSPCC307	Data Structures and Algorithms Lab	LC	30	20	50	-	-	1	1
BTCSPCC308	Object Oriented Programming Lab	LC	30	20	50	-	-	1	1
BTCSPCC309	Software Engineering Lab	LC	30	20	50	-	-	1	1
BTCSPCCAIML 310	Python Lab	LC	30	20	50	-	-	1	1
BTCSPCC311	Internet & Web Technology Lab	LC	30	20	50	-	-	1	1
BTCSPROJ 312	Industrial Training/Seminar	PROJ	30	20	50	-	-	1	1
BTCSHSMC313	Social Outreach, Discipline & Extra Curricular Activities	HSMC	50		50	-	-	-	1
BTHSMC314	ANANDAM	AECC	50	50	100	1	-	1	2
	TOTAL		460	590	1050	19	0	6	27

BTCSBSC 301: Discrete Mathematical Structures

Course Objective:

- To develop logical thinking and its application to computer science, especially to emphasize the importance of proving statements correctly
- To develop the concept of number theory.
- To enhances one's ability to reason and ability to present a coherent and mathematically accurate argument.
- To build theoretical concepts behind various higher level concepts such as graphs.
- To learn the concept of group theory and its various applications.

Course Contents:

Unit I: **Notion of proof**: Propositional and predicate logic, proof by counterexample, the contrapositive, proof by contradiction, inductive proofs. Propositional and predicate logic

Unit II: **Number Theory**- Divisibility, Euclidean algorithm, prime numbers, Fundamental Theorem of Arithmetic, greatest common divisors, Fermat's little theorem, Congruence's, solution of congruence's, Chinese remainder theorem, Euler's phi function, Quadratic residues and reciprocity, Jacobi Symbol, binary quadratic forms, equivalence and reduction of binary forms, sums of two squares, greatest integer function, arithmetic functions,

Unit III: **Combinatorial number theory: Basic counting techniques, pigeon-hole principle, recurrence relations, generating functions, Polya's counting theorem. Introduction to probabilistic method in combinatorics, Inclusion-exclusion principle, Techniques of numerical calculation, Public key Cryptography.**

Unit IV: **Graph Theory**- Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs, matching, vertex/edge covering.

Unit V: **Algebraic Structures**: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups,

Text Books:

1. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
2. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.
3. S.B. Singh, Discrete Structures, Khanna Book Publishing Company, 2019.

References:

1. Chartrand, Lesniak, and Zhang, *Graphs and Digraphs*, Fifth Edition. CRC Press. 2010.
2. D. Jungnickel. Graphs, *Networks and Algorithms*, Fourth Edition. Springer. 2013.
3. Douglas B. West. *Introduction to Graph Theory*, Second Edition. Prentice Hall. 2001.
4. I. Niven, H.S. Zuckerman, H. L. Montgomery, *An Introduction to theory of numbers (fifth edition)*, John Wiley & Sons, Inc.
5. Neal Koblitz, *A course in Number theory and Cryptography (second edition)*, Springer-Verlag.

Course Outcomes:

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

CO1:	Underline the features of C++ supporting object oriented programming.
CO2:	Describe the relative merits of C++ as an object oriented programming language.
CO3:	Use how to produce object-oriented software using C++.
CO4:	Describe how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.
CO5:	Understand advanced features of C++ specifically stream I/O, templates and operator overloading.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L1	H	M	H	M	H	-	-	-	L	M	L	L	L	L
CO2	L2	H	M	M	M	M	-	-	-	L	M	-	M	M	L
CO3	L3	H	M	L	M	M	-	-	-	L	M	L	L	M	L
CO4	L1	M	M	M	M	M	L	-	-	L	M	-	M	L	M
CO5	L2	H	M	H	H	L	L	-	-	L	M	-	L	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	CO3, CO4, CO5
CD4	Self- learning advice using internets	CO2, CO3, CO5
CD5	Industrial visit	CO4, CO5

BTCSPCCAIML 303: Python Programming

Course Objective:

The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.

Course Contents:

Unit I: Python Interpreter, The Interpreter and Its Environment, Control Flow Tools if Statements, for Statements, The range() Function, break and continue Statements, and else Clauses on Loops, pass Statements, Defining Functions, More on Defining Functions .

Unit II: **Data Structures :** More on Lists , The del statement , Tuples and Sequences, Sets, Dictionaries Looping Techniques, More on Conditions, Comparing Sequences and Other Types .

Unit III: Functions, Modules, Standard Modules, The dir() Function, Packages, Files, Tuple Packing and Unpacking

Unit IV: **Input and Output:** Fancier Output Formatting , Reading and Writing Files, Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions , Defining Clean-up Actions, Predefined Clean-up Actions

Unit V: **Classes :** A Word About Names and Objects, Python Scopes and Namespaces, Inheritance, Private Variables, Odds and Ends, Iterators, Generators, Generator Expressions, Standard Library : Operating system Interface, command line Argument, String Pattern matching, Internet access

References:

1. Starting Out with Python (2009) Pearson , Tonny Gaddis
2. Beginning Python Wrox Publication Peter Norton, Alex Samuel
3. Python Algorithms Apress, Magnus Liet Hetland,
4. Python Object Oriented Programming PACKT Press, Dusty Phillips
5. Python for Unix and Linux System Administration O'Reilly, Noad Gift

Course Outcomes:

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

CO1:	Discuss the algorithms to determine the time and Computation complexity and justify the correctness.
CO2:	Implement given Search problem (Linear Search and Binary Search).
CO3:	Implement Stack and Queue and analyze the same to determine the time and computation complexity.
CO4:	Apply an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
CO5:	Implement Graph search and traversal algorithms and determine the time and computation complexity.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	H	H	H	-	L	-	-	L	M	-	L	M	M
CO2	L3	H	H	M	H	M	-	-	-	L	M	-	M	H	L
CO3	L3	H	M	L	M	M	-	-	-	L	M	M	L	M	M
CO4	L3	M	H	M	H	M	L	-	-	L	M	M	M	H	M
CO5	L4	H	M	H	M	L	L	-	-	L	M	M	L	H	L

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	CO3, CO4, CO5
CD4	Self- learning advice using internets	CO2, CO3, CO5
CD5	Industrial visit	CO4, CO5

BTCSPCC 305: Internet & Web Technology

Course Objectives:

- To design and develop a dynamic website
- To provide some basic knowledge of web services which are useful for the same

Course Contents:

Unit-I Introduction to Web: what is www, Protocols and programs, application and development tools like Dream Weaver , Gif Animator , the web browser, What is server, Search Engines choices, setting up web servers, Logging users, dynamic IP Web Design: Web site design principles, planning the site and navigation,

Unit-III Introduction to HTML: What HTML is-and What It isn't, History of HTML, Structuring HTML page, The HTML><HEAD><TITLE><BODY>tags, Paragraphs, Font tags, Creating different types of Links, Introduction to lists, Different types of lists. , Table pats, Sizing tables, borders, cells, Table and cell color and alignment, Aligning your table content, spanning multiple rows and columns, grouping and aligning rows and columns.

Unit-III Scripting: What is the scripting, server side and client side scripting, Javascript : Client side scripting, What is Javascript, How to develop Javascript, simple Javascript, variables, functions, conditions, loops and repetition

Unit-IV DHTML: What is DHTML, The concept of style sheets, Approaches to style sheets, commonly used style sheet properties and values, Controlling page layout CSS properties, Backgrounds, colors and images, setting border appearance Inline style sheets

Unit-V Web Forms: Understanding forms and functions, Essential elements of forms. Displaying control labels, Grouping control with field set and legend, What are frames , Working with linked windows, Working with frames, Changing frame borders

Text Books:

1. K. K. Sharma, "Web Technology", A.B. Publication Delhi, First Edition, 2008.
2. Jonathan Gennick with Tom Luers, 'Teach yourself HTML', 2nd Edition ,SAMS
3. Ethan Cerami, "Web Services", O'Reilly Media, 2002.
4. Achyut S Godbole and AtulKahate, "Web Technologies", Tata McGraw Hill.

References:

1. Raj Kamal , "Internet and Web Technologies", TMH.
2. Deitel, "Internet & World Wide Web , How to Program", PHI.
3. HTML: A Beginner's GuidebyWendy Willard (Author)
4. Rick Darnell, "HTML4 unleashed", Techmedia Publication, 2000.
5. H. M. Ramachandran , "Internet & Web development", Dhruv.
6. Yeshwant Kanetkar, "HTML, DHTML, Java script, Perl CGI", BPB.

Course Outcomes:

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

CO1:	Understand large scale software development from a broader perspective, and function in multidisciplinary teams.
CO2:	Apply knowledge gained in the course to practical software development situations.
CO3:	Describe software systems to meet desired needs with realistic constraints.
CO4:	Describe software development activities.
CO5:	Discuss contemporary issues in Software development and engage in life-long learning, understand professional and ethical responsibility

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	M	H	M	-	-	-	-	L	L	L	M	H	M
CO2	L3	H	L	M	L	M	-	-	-	M	L	L	M	M	H
CO3	L1	H	M	L	M	M	-	-	-	H	M	-	M	M	M
CO4	L1	M	L	M	L	M	-	-	-	M	L	L	M	H	M
CO5	L2	H	H	H	H	L	-	-	-	M	L	L	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	CO3, CO4, CO5
CD4	Self- learning advice using internets	CO2, CO3, CO5
CD5	Industrial visit	CO4, CO5

BTCSPCC307: Data Structures and Algorithms Lab

Course Objectives:

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

List of Experiments:

S.No.	*List of Exercises*
1	Write a program to insert an element at desire position in the array.
2	Write a program to delete an element at desire position from the array.
3	Write a program to replace an element at desire position in the array.
4	Write a program to search (linear search) an element in the array.
5	Write a program to search (binary search) an element in the array.
6	Write a program to addition and multiply of two matrices.
7	Write a program to implementation of stack using array.
8	Write a program to implementation of queue using array.
9	Write a program to implementation link list.
10	Write a program that sorts the array through Bubble sort.
11	Write a program that sorts the array through Quick sort.
12	Write a program that sorts the array through Merge sort.
13	Write a program that sorts the array through Insertion sort.
14	Write a program to BST (binary search tree) addition, deletion and searching.

Course Outcomes:

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

CO1:	Apply OOP's features to program design and implementation.
CO2:	Create Classes according to the problem and implement programs in C++
CO3:	Implement Object Oriented Programs using templates and exceptional handling concepts.
CO4:	Perform console operations, applications and file handling.
CO5:	Implement applications using C++.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L3	H	M	H	M	M	-	-	-	L	L	-	L	M	M
CO2	L6	M	M	H	M	L	-	-	-	M	L	-	L	M	M
CO3	L3	M	M	H	M	L	-	-	-	L	M	-	L	H	L
CO4	L3	H	H	H	H	-	-	-	-	M	M	-	L	M	M
CO5	L3	H	M	H	M	M	-	-	-	M	L	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	CO4
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	CO5

BTCSPCC 309: Software Engineering Lab

Course Objective:

- To help students to develop skills that will enable them to construct software of high quality software that is reliable and reasonably also easy to understand, modify and maintain.
- To foster an understanding of why these skills are important.

Tool Required: Rational Rose Enterprise Edition

List of Experiments:

1. Development of requirements specification, function oriented design using/SD, object-oriented design using UML, test case design, and implementation using Java and testing. Use of appropriate CASE tools and other tools such as configuration management tools, program analysis tools in the software lifecycle.
2. Develop Software Requirements Specification (SRS) for a given problem in IEEE template.
3. Develop DFD model (level-0, level-1 DFD and Data dictionary) of the project.
4. Develop structured design for the DFD model developed.
5. Developed all Structure UML diagram of the given project.
6. Develop Behavior UML diagram of the given project.

Course Outcomes:

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

CO1: Create, Test and Debug Python Programs

CO2: Implement Conditionals and Loops for Python Programs

CO3: Use functions and represent Compound data using Lists, Tuples and Dictionaries

CO4: Read and write data from & to files in Python and develop Application using Python.

CO5: Illustrate sort methods in Python Programs.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L6	H	M	M	M	M	-	-	-	L	M	L	L	M	M
CO2	L3	M	M	M	M	L	-	-	-	M	M	L	M	H	M
CO3	L2	H	L	H	L	M	-	-	-	L	L	L	M	H	H
CO4	L6	H	M	H	M	M	-	-	-	M	M	M	L	H	H
CO5	L3	M	M	M	M	L	-	-	-	M	M	L	M	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4,CO5
CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	-
CD4	Self- learning advice using internets	CO2, CO3, CO4
CD5	Industrial visit	-

BTCSPCC 311: Internet & Web Technology Lab

Course Objective:

- To design web development Software and to understand web technologies.
- To make student able for designing and developing the web applications.

List of Experiments

1. Write a program to display different style of heading text?
2. Develop and demonstrate a HTML document that illustrates the use external style sheet, ordered list, table, borders, padding, color, and the tag
3. Write an html code for creates the ordered list.
4. Web page creation with all types of cascading style sheets.
5. Create a html registration form and to validate the form using JavaScript code.
6. Create a web page that displays college information using various style sheets.
7. To write a JavaScript program to define a user defined function for sorting the values in an array.
8. Create a web page with field username, password, date of birth, email, and gender contact no.
9. Create a webpage to demonstrate the validation.

BTCSHSMC 313: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem

Course Outcomes:

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

CO1:	Develop their self-confidence, leadership qualities, and their responsibilities towards the community.
CO2:	Have an impact on academic development, personal development, and civic responsibility
CO3:	Understand the value of Social Work.
CO4:	Understand the Significance of Discipline in student's Life
CO5:	Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs,

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

BTBSC314: ANANDAM

Objectives:

- To instill the joy of giving in young people, turning them into responsible citizens to build up a better society.
- To inculcate the habit of service in students across the University.
- A compulsory course of 2 credits per semester to be included in each program of University.
- Students to be expected to engage in individual and group acts of service and goodness.

Action Plan:

Students will be expected to

- Do at least one act of individual service each day
- Record this act of service in a dedicated Register / Personal Diary
- Share this Register / Personal Diary day in the Anandam Class scheduled per week. The class interaction will include Personal Diary check, Showing of Community based motivation videos, Community based presentations by students, Role playing etc.
- Undertake one group service project for 64 hours every semester (outside college hours)
- Upload the report on the group project on the Anandam platform
- Participate in a sharing and presentation on the group service in the discussion sessions held once in week
- There will be some suggested projects and organizations that students can work with. Students can also suggest their own projects which others can join

Each student will finish the year with a portfolio of giving. This will include their Register / Personal Diaries and their reports on group service projects.

Semester-IV

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSBSC401	Probability and Optimization Theory	PCC	30	70	100	3	1	-	4
BTCSPCCAIML402	Machine Learning-I	PCC	30	70	100	3	-	-	3
BTCSPCCAIML403	Artificial Intelligence	PCC	30	70	100	2	-	-	2
BTCSPCC404	Database Management System	PCC	30	70	100	3	-	-	3
BTCSPCC405	Theory of Computation	PCC	30	70	100	3	1	-	4
BTCSPCC406	Data Communication and Computer Networks	PCC	30	70	100	3	-	-	3
PRACTICALS/ VIVA VOCE		Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSPCCAIML407	Machine Learning-I Lab	LC	30	20	50	-	-	1	1
BTCSPCC 408	Database Management System Lab	LC	30	20	50	-	-	1	1
BTCSPCC 409	Network Programming Lab	LC	30	20	50	-	-	1	1
BTCSPCC410	Linux Shell Programming Lab	LC	30	20	50	-	-	1	1
BTCSPCC411	Java Lab	LC	30	20	50	-	-	1	1
BTCSHSMC412	Social Outreach, Discipline & Extra Curricular Activities	HSMC	50		50	-	-		1
BTHSMC413	ANANDAM	AECC	50	50	100	1	-	1	1
	TOTAL		430	570	1000	18	2	6	27

BTCSBSCS401: Probability and Optimization Theory

Course Objective:

- To learn basics of probability.
- To understand and apply discrete and continuous instances along with real world phenomenon of standard distributions.
- To understand the concept of correlation and analysis of regression.
- To understand and apply the optimization theory.
- To understand Transportation and assignment problems.

Course Content:

Unit I : PROBABILITY AND RANDOM VARIABLES: Introduction to probability, Axioms of probability - Conditional probability - Total probability – Baye's theorem, Random variable - Probability mass function - Probability density function - Properties – Moments - Moment generating functions and their properties.

Unit II :Distributions: Binomial, Poisson, Geometric, Uniform, Exponential, Weibull and Normal distributions and their properties. Joint distributions - Marginal and conditional distributions. Transformation of random variables - Central limit theorem

Unit III: Correlation and Regression Analysis:– Covariance – Correlation and regression , Curve fitting, Line of Regression, Curve fitting, Line of Regression

Unit IV : Linear Programming: Simplex method, Two Phase Method and Duality in Linear Programming.

UnitV: Application of Linear Programming: Transportation Problems, North-West Corner rule, Vogle's approximation method, and Assignment Problems: Hungarian Method, Job Sequencing

Text Books:

1. Ross, S., "A first course in probability", 9th Edition, Pearson Education, Delhi, 2019.
2. Medhi J., "Stochastic Processes", New Age Publishers, New Delhi, 2017. (Chapters 2, 3,4)
3. T. Veerarajan, "Probability, Statistics and Random process", Second Edition, Tata McGraw Hill, New Delhi, 2017.

Reference Books:

1. Allen A.O., "Probability, Statistics and Queuing Theory", Academic press, New Delhi, 2010.
2. Taha H. A., "Operations Research-An Introduction", Seventh Edition, Pearson Education Limited, Asia, Delhi, 2014.
3. John F. Shortle , James M. Thompson, Donald Gross, Carl M. Harris Fundamentals of Queueing Theory, Wiley Series 2018.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	M	L	M	L	-	-	-	-	M	-	L	M	M
CO2	L2	H	M	L	M	L	-	L	-	-	M	-	L	M	M
CO3	L2	H	L	L	L	M	-	-	-	-	L	-	L	M	M
CO4	L2	H	L	L	L	L	-	L	-	-	L	-	L	M	M
CO5	L2	M	L	L	L	-	-	-	-	-	L	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO1,CO2, CO3,
CD3	Seminars	CO3, CO4
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	CO1, CO2, CO3, CO4, CO5

BTCSPCCAIML403: Artificial Intelligence

Course Objective:

- To introduce the basic principles, techniques, and applications of **Artificial Intelligence**.
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.

Course Contents:

Unit I: Introduction to AI and Intelligent agent: Different Approach of AI, Problem Solving : Solving Problems by Searching, Uninformed search, BFS, DFS, Iterative deepening, Bi directional search, Hill climbing, Informed search techniques: heuristic, Greedy search, A* search, AO* search, constraint satisfaction problems.

Unit II: Game Playing: Minimax, alpha-beta pruning, jug problem, chess problem, tiles problem

Unit III: Knowledge and Reasoning: Building a Knowledge Base: Propositional logic, first order logic, situation calculus. Theorem Proving in First Order Logic.Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks

Unit IV: Learning: Overview of different forms of learning, Supervised base learning: Learning Decision Trees, SVM, Unsupervised based learning, Market Basket Analysis, Neural Networks.

Unit V: Introduction to Natural Language Processing: Different issue involved in NLP, Expert System, Robotics.

Text/ Reference Books:

- E.Rich,K Knight-Artificial Intelligence,Tata McGraw Hills.
- S.Russell,P.Norving-Artificial Intelligence-A Modern Approach, Pearson Education,Asia.
- Thomas Dean-Artificial Intelligence-Theory & Practice, Pearson Education, Asia.
- Alison Coursey - The Essence of Artificial Intelligence, Pearson Education, Asia.

Course Outcomes:

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

CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO3	Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
CO4	Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

Unit V: Transaction Processing: Introduction-Transaction State, Transaction properties, Concurrent Executions. Need of Serializability, Conflict vs. View Serializability, Testing for Serializability, Recoverable Schedules, Cascadeless Schedules.**Concurrency Control:** Implementation of Concurrency: Lock-based protocols, Timestamp-based protocols, Validation-based protocols, Deadlock handling, Database Failure and Recovery: Database Failures, Recovery Schemes: Shadow Paging and Log-based Recovery, Recovery with Concurrent transactions.

Text and References:

1. Date C J, "An Introduction to Database System", Addision Wesley.
2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley
4. Leon & Leon, "Database Management System", Vikas Publishing House.
5. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
6. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
7. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson.

Course Outcomes:

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

CO1:	Describe given query write relational algebra expressions for that query and optimize the developed expressions
CO2:	Understand given specification of the requirement design the databases using E-R method and normalization.
CO3:	Understand given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
CO4:	Demonstrate given query optimize its execution using Query optimization algorithms
CO5:	Discuss a given transaction-processing system; determine the transaction atomicity, consistency, isolation, and durability.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L1	H	L	M	L	H	-	-	-	L	L	L	M	M	M
CO2	L2	H	M	M	M	M	-	-	-	-	M	L	L	M	M
CO3	L2	H	L	M	L	H	-	-	-	-	L	L	M	M	M
CO4	L3	H	H	H	H	M	-	-	-	L	H	L	L	H	M
CO5	L2	H	H	M	H	M	-	-	-	L	H	M	L	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO4, CO5
CD3	Seminars	CO3, CO4
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	CO2, CO5

BTCSPCC 405: Theory of Computation

Course Objectives:

- To develop a formal notation for strings, languages and machines.
- To Design finite automata to accept a set of strings of a language.
- To prove that a given language is regular and apply the closure properties of languages.
- To Design context free grammars to generate strings from a context free language and convert them into normal forms.
- To Prove equivalence of languages accepted by Push Down Automata and languages generated by context free grammars.
- To identify the hierarchy of formal languages, grammars and machines.
- To distinguish between computability and non-computability and Decidability and un-decidability.

Course Contents:

Unit I: **Introduction:** Basic machine, Finite state machine, Transition graph, Transition matrix, Deterministic and nondeterministic finite automation, Equivalence of DFA and NDFA, Decision properties, minimization of finite automata, Mealy & Moore machines.

Unit II: **Finite Automata & Regular Expression:** Alphabet, words, Operations, Regular sets, relationship and conversion between Finite automata and regular expression and

BTCSPCC 406: Data Communication and Computer Networks

Course objectives:

- To Understand about the evolution of data communication and networking paradigms
- To Understand the principles of data communication, channel characteristics, signaling, modulation and encoding, and multiplexing (SONET/SDH)
- To know about the various transmission media, their comparative study.
- To Understand about the channel error detection and correction, MAC protocols, Ethernet and WLAN
- To understand the operations of TCP/UDP, FTP, HTTP, SMTP, SNMP, etc.

Course Contents:

Unit I: Network hardware, Network software, topologies, Protocols and standards, OSI model, TCP model, TCP/IP model

Unit II: **Physical Layer:** Digital and Analog Signals, Periodic Analog Signals, Signal Transmission, Limitations of Data Rate, Digital Data Transmission, Performance Measures, Line Coding, Digital Modulation, Media and Digital Transmission System.

Unit III: **Data Link Layer:** Error Detection and Correction, Types of Errors, Two dimensional parity check, Detection verses correction, Block Coding, Linear Block Coding, Cyclic Codes, Checksum, Standardized Polynomial Code, Error Correction Methods, Forward Error Correction, Protocols: Stop and wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding window, Piggy backing, Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA.

Unit IV: **Network Layer:** Design issues, Routing algorithms: IPV4, IPV6, Address mapping: ARQ, RARQ, Congestion control, Unicast, Multicast, Broadcast routing protocols, Quality of Service, Internetworking.

Unit V: **Transport Layer:** Transport service, Elements of transport protocols, User Datagram Protocol, Transmission Control Protocol, and Quality of service, Leaky Bucket and Token Bucket algorithm.

Application Layer: WWW, DNS, Multimedia, Electronic mail, FTP, HTTP, SMTP, Introduction to network security

References:

1. Computer Networking, J. F. Kurose and K. W. Ross, Pearson education
2. Data Communications and Networking; B.A. Forouzan, Tata-McGraw-Hill
3. Computer Networks; A.S. Tanuenbaum
4. Communication Networks; Garcia and Widija, Tata-McGraw-Hill

B.Tech. CSE (AI-ML) 2022-26

Course Outcomes:

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

CO1:	Explain the functions of the different layer of the OSI Protocol.
CO2:	Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
CO3:	Calculate requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
CO4:	Calculate problem related TCP/IP protocol developed the network programming.
CO5:	Discuss DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	L	M	L	-	-	-	-	-	L	-	M	L	L
CO2	L3	H	M	M	M	-	-	-	-	-	M	-	L	L	L
CO3	L3	H	L	M	L	-	-	-	-	-	L	-	M	M	M
CO4	L3	H	H	H	H	-	-	-	-	-	H	-	L	L	M
CO5	L2	H	H	M	H	-	-	-	-	-	M	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO4, CO5
CD3	Seminars	CO3, CO4
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	CO2, CO5

BTCSPCC 408: Database Management System Lab

Course objectives:

- To Understand Tables with necessary constraints ,keys and data types, Inserting data and manipulating data as per needs
- To Understand SQL Queries to retrieve required information from single/multiple tables , Creating views and manipulating them as needed
- To Implementing Operations on relations (tables) using PL/SQL
- To Writing triggers for implementing automatic operations and implementing constraints

List of Experiments:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER, UPDATE and DELETE.
4. Write the queries to implement the joins.
5. Write the query for implementing the following functions: MAX (), MIN (), AVG () and COUNT ().
6. Write the query to implement the concept of Integrity constrains.
7. Write the query to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion , updation and deletion
10. Using the referential integrity constraints.
11. Write the query for creating the users and their role.

B.Tech. CSE (AI-ML) 2022-26

Course Outcomes:

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

CO1:	Describe a Database without anomalies as per requirements
CO2:	Practice complex queries to retrieve required information from database
CO3:	Understand SQL for generating necessary reports.
CO4:	Practice procedures and functions for required database tasks.
CO5:	Demonstrate assertions to implement integrity constraints on multiple tables

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L1	H	M	H	M	M	-	-	-	L	M	-	L	M	M
CO2	L3	M	M	H	M	L	-	-	-	L	M	-	M	M	M
CO3	L2	M	M	H	M	L	-	-	-	L	M	-	L	H	M
CO4	L3	H	H	H	H	L	-	-	-	L	H	-	M	H	M
CO5	L3	H	M	H	M	M	-	-	-	M	M	-	L	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	-
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	-

BTCSPCC 410: Linux Shell Programming Lab

Course Objectives:

- study the basic and administration concepts in Linux

List of Experiments:

1. Use of Basic Unix Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc,sort, cut, grep, df, dfspace, du, ulimit.
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script based on control structure -If-then-fi, if-then-else-if, nested if -else, to find:
   - 3.1 Greatest among three numbers.
   - 3.2 To find a year is leap year or not.
   - 3.3 To input angles of a triangle and find out whether it is valid triangle or not.
   - 3.4 To check whether a character is alphabet, digit or special character.
   - 3.5 To calculate profit or loss.
4. Shell Programming Looping-while, until, for loops
   - 4.1 Write a shell script to print all even and odd number from 1 to 10.
   - 4.2 Write a shell script to print table of a given number
   - 4.3 Write a shell script to calculate factorial of a given number.
   - 4.4 Write a shell script to print sum of all even numbers from 1 to 10.
   - 4.5 Write a shell script to print sum of digit of any number.
5. Shell Programming - case structure, use of break
   - 5.1 Write a shell script to make a basic calculator which performs addition, subtraction, Multiplication, division
   - 5.2 Write a shell script to print days of a week.
   - 5.3 Write a shell script to print starting 4 months having 31 days.
6. Shell Programming -Functions
   - 6.1 Write a shell script to find a number is Armstrong or not.
   - 6.2 Write a shell script to find a number is palindrome or not.
   - 6.3 Write a shell script to print Fibonacci series.
   - 6.4 Write a shell script to find prime number.
   - 6.5 Write a shell script to convert binary to decimal and decimal to binary
7. Write a shell script to print different shapes -Diamond, triangle, square, rectangle, hollow square etc.
8. Shell Programming –Arrays
   - 8.1 Write a C program to read and print elements of array.
   - 8.2 Write a C program to find sum of all array elements.
   - 8.3 Write a C program to find reverse of an array.
   - 8.4 Write a C program to search an element in an array.
   - 8.5 Write a C program to sort array elements in ascending or descending order.

B.Tech. CSE (AI-ML) 2022-26

Course Outcomes:

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

CO1:	Experiment students able to implement CPU scheduling algorithms and Bankers algorithm used for deadlock avoidance and prevention.
CO2:	Implement page replacement and memory management algorithms.
CO3:	Apply UNIX/LINUX operating system commands.
CO4:	Understand different UNIX/LINUX shell scripts and execute various shell programs
CO5:	Implement virtualization by installing Virtual Machine software.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L4	H	M	H	M	M	-	-	-	M	M	-	L	M	M
CO2	L3	M	M	H	M	L	-	-	-	L	M	-	M	H	M
CO3	L3	M	M	H	M	L	-	-	-	M	M	-	L	H	M
CO4	L2	H	H	H	H	L	-	-	-	L	H	-	M	M	M
CO5	L3	H	M	H	M	M	-	-	-	M	M	-	L	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	-
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	-

BTCSHSMC 412: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem

Course Outcomes:

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

CO1:	Develop their self-confidence, leadership qualities, and their responsibilities towards the community.
CO2:	Have an impact on academic development, personal development, and civic responsibility
CO3:	Understand the value of Social Work.
CO4:	Understand the Significance of Discipline in student's Life
CO5:	Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs,

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

BTBSC413: ANANDAM

Objectives:

- To instil the joy of giving in young people, turning them into responsible citizens to build up a better society.
- To inculcate the habit of service in students across the University.
- A compulsory course of 2 credits per semester to be included in each program of University.
- Students to be expected to engage in individual and group acts of service and goodness.

Action Plan:

Students will be expected to

- Do at least one act of individual service each day
- Record this act of service in a dedicated Register / Personal Diary
- Share this Register / Personal Diary day in the Anandam Class scheduled per week. The class interaction will include Personal Diary check, Showing of Community based motivation videos, Community based presentations by students, Role playing etc.
- Undertake one group service project for 64 hours every semester (outside college hours)
- Upload the report on the group project on the Anandam platform
- Participate in a sharing and presentation on the group service in the discussion sessions held once in week
- There will be some suggested projects and organizations that students can work with. Students can also suggest their own projects which others can join

Each student will finish the year with a portfolio of giving. This will include their Register / Personal Diaries and their reports on group service projects.

B. Tech. CSE (AI&ML)

Semester –V

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSPCCAIML501	Machine Learning-II	Core	30	70	100	3	-	-	3
BTCSPCCAIML502	Deep Learning	Core	30	70	100	3	-	-	3
BTCSPCC503	Operating System	Core	30	70	100	3	-	-	3
BTCSPCC504	Computer Graphics & Multimedia	Core	30	70	100	3	-	-	3
BTCSPCC505	Analysis of Algorithms	Core	30	70	100	3	-	-	3
BTCSPEC 506A	Software Project Management	Elective	30	70	100	3	-	-	3
BTCSPEC 506B	Human Computer Interaction	Elective	30	70	100	3	-	-	3
BTCSPEC 506C	Bio-informatics	Elective	30	70	100	3	-	-	3
BTHSMC 507	Professional Skills	HSMC	30	70	100	2	-		2
PRACTICALS/ VIVA VOCE		**Type**	**Internal Marks**	**External Marks**	**Total**	**L**	**T**	**P**	**Credits**
BTCSPCCAIML508	Machine Learning-II Lab	Core	30	20	50	-	-	1	1
BTCSPCC509	Computer Graphics & Multimedia Lab	Core	30	20	50	-	-	1	1
BTCSPCC 510	Analysis of Algorithms Lab	Core	30	20	50	-	-	1	1
BTCSPCCAIML511	Deep Learning Lab	Core	30	20	50	-	-	1	1
BTCSPROJ 512	Industrial Training/Seminar	PROJ	30	20	50	-	-	1	1
BTCSHSMC 513	Social Outreach, Discipline & Extra Curricular Activities	HSMC	50		50				1
BTHSMC514	ANANDAM	AECC	50	50	100	1	-	1	2
	TOTAL		460	640	1100	21	0	6	28

BTCSPCCAIML 501: Machine Learning-II

Course Objectives:

- To introduce students to the basic concepts and techniques of **Machine Learning**
- To develop skills of using recent **machine learning** software for solving practical problems.
- To gain experience of **doing independent study and research**.

Course Contents:

Unit I: **Key concepts**: Supervised/Unsupervised Learning, Loss functions and generalization, Probability Theory, **Parametric vs Non-parametric methods, Elements of Computational Learning Theory Ensemble Learning, Bagging, Boosting, Random Forest**

Unit II: **Kernel**: Kernel Methods for non-linear data, Support Vector Machines, Kernel Ridge Regression, Structure Kernels, Kernel PCA, Latent Semantic Analysis

Unit III: **Discriminative Models**: Least Square Regression, Gradient Descent Algorithm, Univariate and Multivariate Linear Regression, Prediction Model, probabilistic interpretation, Regularization, Logistic regression, multi class classification,

Unit IV: **Dimensionality Reduction** - CCA, LDA, ICA, NMF - Canonical Variates - Feature Selection vs Feature Extraction

Unit V: **Filter Methods** - Sub-space approaches - Embedded methods Low-Rank approaches - Recommender Systems ,Application areas - Security - Business - Scientific

Reference/Text Books:

- Tom M Mitchell, Machine Learning, McGraw Hill Education
- Bishop, C. (2006). Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.
- Duda, Richard, Peter Hart, and David Stork. Pattern Classification. 2nd ed. New York, NY: Wiley-Interscience, 2000. ISBN: 9780471056690.
- J. Shawe-Taylor and Nello Cristianini, Kernel Methods for Pattern Analysis, Cambridge University Press, 2004.
- D. Koller and N. Friedman, Probabilistic Graphical Models – Principles and Techniques, MIT Press, 2009.
- Goodfellow, Y. Bengio , A. Courville, Deep Learning, MIT Press, 2017
- R. Sutton, Reinforcement Learning – An Introduction, MIT Press, 1998

Course Outcomes:

CO1: Able to understand the mathematics behind functioning of artificial neural networks

CO2: Able to analyze the given dataset for designing a neural network based solution

CO3: Able to carry out design and implementation of deep learning models for signal/image processing applications

CO4: Able to design and deploy simple TensorFlow-based deep learning solutions to classification problems

CO5: Able to design and deploy Autoencoder Architecture and RNN Models

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	L3	M	M	H	H	-	-	-	-	L	M	-	M	L	M
CO2	L1	M	H	M	H	-	-	-	-	M	H	-	M	L	M
CO3	L2	H	M	L	M	-	-	-	-	H	M	-	M	M	M
CO4	L3	M	H	M	H	-	-	-	-	M	H	-	M	M	M
CO5	L2	H	H	L	H	-	-	-	-	L	H	-	H	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3,
CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	CO3, CO4,
CD4	Self- learning advice using internets	CO2, CO5
CD5	Industrial visit	-

BTCSPCC 503: Operating System

Course Objective:

- To learn the mechanisms of Operating System to handle processes and threads.
- To learn the mechanisms involved in memory management in OS.
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- To know the components and management aspects

Course Contents:

Unit I: Introduction and History of Operating systems: Structure and operations; processes and files Processor management: inter process communication, mutual exclusion, semaphores, wait and signal procedures, process scheduling and algorithms, critical sections, threads, multithreading

Unit II: Memory management: contiguous memory allocation, virtual memory, paging, page table structure, demand paging, page replacement policies, thrashing, segmentation, case study

Unit III: Deadlock: Shared resources, resource allocation and scheduling, resource graph models, deadlock detection, deadlock avoidance, deadlock prevention algorithms.

Device management: devices and their characteristics, device drivers, device handling, disk scheduling algorithms and policies

Unit IV: File management: file concept, types and structures, directory structure, cases studies, access methods and matrices, file security, user authentication

Unit V: UNIX and Linux operating systems as case studies; Time OS and case studies of Mobile OS

Text/Reference Books:

- Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne Wiley Asia Student Edition
- Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
- Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
- Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley

- R Plastock and G Kalley, Theory and Problems of Computer Graphics, Schaum's Series , McGraw Hill.
- Ralf Steinmetz & KlaraNahrstedt - Multimedia: computing, Communication & Applications, Pearson Education Asia.
- PrabhatK. Andleigh-Multimedia System Design, Prentice Hall,KiranThakrar.

Course Outcomes

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

CO1:	List the basic concepts used in computer graphics.
CO2:	Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
CO3:	Describe the importance of viewing and projections.
CO4:	Define the fundamentals of animation, virtual reality and its related technologies.
CO5:	Implement various algorithms for Colour Models and curves

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L1	H	M	M	M	-	-	-	-	-	M	-	L	M	M
CO2	L3	H	L	M	L	L	-	-	-	-	L	-	M	M	M
CO3	L2	H	H	M	H	L	-	-	-	-	H	-	L	M	M
CO4	L1	H	M	L	M	-	-	-	-	-	M	-	M	H	M
CO5	L2	H	H	L	M	L	-	-	-	-	M	-	M	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3,CO4,CO5
CD2	Tutorials/Assignments	CO3,CO4
CD3	Seminars	CO4

CD4	Self- learning advice using internets	CO2,CO3,CO4
CD5	Industrial visit	-

BTCSPCC 505: Analysis of Algorithms

Course Objective:

- To analyze the asymptotic performance of algorithms.
- To write rigorous correctness proofs for algorithms.
- To demonstrate a familiarity with major algorithms and data structures.
- To apply important algorithmic design paradigms and methods of analysis.
- To synthesize efficient algorithms in common engineering design situations.

Course Contents:

Unit I: Background: Review of Algorithm, Complexity Order Notations: definitions and calculating complexity .Divide And Conquer Method: Binary Search, Merge Sort, Quick sort and Strassen's matrix multiplication algorithms.

Unit II: Greedy Method: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees. Dynamic Programming: Matrix Chain Multiplication. Longest Common Subsequence and 0/1 Knapsack Problem.

Unit III: Branch And Bound: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem. Pattern Matching Algorithms: Naive and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms.

Unit IV: Assignment Problems: Formulation of Assignment and Quadratic Assignment Problem. Randomized Algorithms- Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2- SAT. Problem definition of Multi-commodity flow, Flow shop scheduling and Network capacity assignment problems.

Unit V: Problem Classes Np, Np-Hard And Np-Complete: Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems.Cook's Theorem.Proving NP Complete Problems - Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover and Set Cover Problem

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

References:

1. Robert K. Wysocki —Effective Software Project Management – Wiley Publication, 2011.
2. Walker Royce: —Software Project Management- Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, —Managing Global Software Projects – McGraw Hill Education (India), Fourteenth Reprint 2013.

Course Outcomes:

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

CO1:	Understand Project Management principles while developing software.
CO2:	Gain extensive knowledge about the basic project management concepts, framework and the process models.
CO3:	Obtain adequate knowledge about software process models and software effort estimation techniques.
CO4:	Estimate the risks involved in various project activities.
CO5:	Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	H	L	H	L	-	-	-	-	H	-	H	L	L
CO2	L2	H	H	H	H	M	-	-	-	-	H	-	H	L	L
CO3	L3	H	M	H	M	M	-	-	-	-	M	-	L	L	M
CO4	L2	L	M	H	M	L	-	-	-	-	M	-	H	H	M
CO5	L2	L	H	M	M	L	-	-	-	-	M	-	H	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO5

CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	CO3 ,CO4
CD4	Self- learning advice using internets	CO2,CO3
CD5	Industrial visit	-

BTCSPEC 506 B: Human Computer Interaction

Course Objective:-

- To know what the user-centered design cycle and how to practice this approach to design your own website or other interactive software systems
- To critique existing website and other interactive software using guidelines from human factor theories
- To analyze one after another the main features of a GUI: the use of colors, organization and layout of content, filling the interface with useful and relevant information, and communication techniques; and to critique designs in order to provide better solutions

Course Contents:

Unit I: Historical evolution of the field, Interactive system design, Concept of usability - definition and elaboration, HCI and software Engineering, GUI design and Aesthetics, Prototyping techniques.

Model-based Design and evaluation: Basic idea, introduction to different types of models, GOMS family of models (KLM and CMNGOMS), BFitts' law and Hick-Hyman's law, Model-based design case studies,

Unit II: Guidelines in HCI: Shneiderman's eight, golden rules, Norman's seven principles, Norman's model of interaction, Nielsen's ten heuristics with example of its use Heuristic evaluation, Contextual inquiry, Cognitive walkthrough

Unit III: Empirical research methods in HCI: Introduction (motivation, issues, research question formulation techniques), Experiment design and data analysis (with explanation of one-way ANOVA)

Unit IV: Task modeling and analysis: Hierarchical task analysis (HTA), Engineering task models and Concur Task Tree (CTT),I introduction to formalism in dialog design, design using FSM (finite state machines) State charts and (classical) Petri Nets in dialog design

Unit V: Introduction to CA, CA types, relevance of CA in IS design Model, Human Processor (MHP), OOP- Introduction OOM- Object Oriented Modeling of User Interface Design

Course Outcomes

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

CO1:	Discribe the basic concepts of Bioinformatics and its significance in Biological data analysis.
CO2:	Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
CO3:	Explain about the methods to characterize and manage the different types of Biological data.
CO4 :	Define different types of Biological Databases.
CO5 :	Discuss basics of sequence alignment and analysis.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self-learning advice using internets
CD5	Industrial visit

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	M	M	M	L	-	-	-	-	M	-	L	L	L
CO2	L2	H	L	M	L	L	-	-	-	-	L	-	M	L	L
CO3	L2	H	H	M	H	L	-	-	-	-	H	-	L	L	M
CO4	L1	H	M	-	M	L	-	-	-	-	M	-	M	M	M
CO5	L2	H	L	M	L	L	-	-	-	-	L	-	M	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3,CO4,CO5
CD2	Tutorials/Assignments	CO2, CO3,CO4
CD3	Seminars	CO4,CO5
CD4	Self-learning advice using internets	CO3, CO4,CO5
CD5	Industrial visit	-

BTBSC 507: Professional Skills

Objectives:

- To acquire career skills and fully pursue to partake in a successful career path
- To prepare good resume, prepare for interviews and group discussions
- To explore desired career opportUnities in the employment market in consideration of an individual SWOT.
- Understand the significance of Team Skills and help them in acquiring them
- To help them design, develop and adapt to situations as an individual and as a team.

Course Contents

Unit I: Resume Skills & Interview Skills

Resume Skills : Preparation and Presentation, Introduction of resume and its importance, Difference between a CV, Resume and Bio data, Essential components of a good resume, Resume skills : common errors, Common errors people generally make in preparing their resume, Prepare a good resume of her/his considering all essential components

Interview Skills : Preparation and Presentation, Meaning and types of interview (F2F, telephonic, video, etc.), Dress Code, Background Research, Do's and Don'ts, Situation, Task, Approach and Response (STAR Approach) for facing an interview, Interview procedure (opening, listening skills, closure, etc.), Important questions generally asked in a job interview (open and closed ended questions), Interview Skills : Simulation, Observation of exemplary interviews, Comment critically on simulated interviews, Interview Skills : Common Errors, Discuss the common errors generally candidates make in interview, Demonstrate an ideal interview

Unit II: Group Discussion Skills & Exploring career opportUnities

Meaning and methods of Group Discussion, Procedure of Group Discussion, Group Discussion- Simulation, Group Discussion - Common Errors, Knowing yourself – personal characteristics

Knowledge about the world of work, requirements of jobs including self-employment, Sources of career information, Preparing for a career based on their potentials and availability of opportUnities

Unit III: Presentation Skills, Trust and Collaboration

Types of presentations, Internal and external presentation, Knowing the purpose, Knowing the audience, Opening and closing a presentation, Using presentation tools, Handling questions, Presentation to heterogenic group, Ways to improve presentation skills over time, Explain the importance of trust in creating a collaborative team, Agree to Disagree and Disagree to Agree – Spirit of Team work, Understanding fear of being judged and strategies to overcome fear

BTCSPCCAIML508: Machine Learning-II Lab

Course Objective:

- To Make use of Data sets in implementing the machine learning algorithms
- To Analyze and evaluate simple algorithms for pattern classification.
- To implement the machine learning concepts and algorithms in any suitable language of choice.

List of Experiments

1. Implement and demonstrate the FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Course Outcomes:

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

CO1:	Build intelligent agents for search and games
CO2:	Solve AI problems through programming with Python
CO3:	Learning optimization and inference algorithms for model learning
CO4:	Design and develop programs for an agent to learn and act in a structured environment.
CO5:	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L6	H	M	H	M	M	-	-	-	L	M	-	L	M	M
CO2	L5	M	M	H	M	L	-	-	-	L	M	-	M	H	M
CO3	L1	H	L	H	L	L	-	-	-	L	L	-	M	H	H
CO4	L6	H	M	H	M	M	-	-	-	M	M	-	L	H	H
CO5	L3	M	M	M	M	L	-	-	-	M	M	L	M	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4
CD2	Tutorials/Assignments	CO2, CO3,CO5
CD3	Seminars	-
CD4	Self- learning advice using internets	CO2, CO3, CO4
CD5	Industrial visit	-

BTCSPCC 510: Analysis of Algorithms Lab

Course Objective:

- To Design and implement efficient algorithms for a specified application.
- To Strengthen the ability to identify and apply the suitable algorithm for the given real world problem.

List of Experiments:

1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2. Implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3. a. Obtain the Topological ordering of vertices in a given digraph. b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
4. Implement 0/1 Knapsack problem using Dynamic Programming.
5. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
6. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
7. a. Print all the nodes reachable from a given starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method.
8. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
9. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.
10. Implement N Queen's problem using Back Tracking.

Course Outcomes:

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

CO1:	Discuss algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
CO2:	Understand the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
CO3:	Experiment the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
CO4:	Experiment the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.
CO5:	Practice the Floyd's algorithm, Back Tracking and Spanning Tree

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	M	H	M	M	-	-	-	-	M	L	H	M	M
CO2	L2	H	M	L	H	H	-	-	-	-	H	-	M	H	M
CO3	L4	H	L	M	H	H	-	-	-	-	H	-	M	H	M
CO4	L3	H	L	H	L	M	-	-	-	-	L	L	L	H	H
CO5	L3	M	L	L	L	M	-	-	-	-	L	L	L	H	H

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	-
CD4	Self- learning advice using internets	CO2, CO3, CO4
CD5	Industrial visit	-

CO4:	Ability to identify, formulate and model problems and find engineering solution based on a systems approach.
CO5:	Ability to understand the real problems of world and use the models to solve it.

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	L2	M	H	L	H	L	-	-	-	-	L	-	L	M	M
CO2	L3	M	L	H	H	L	-	-	-	-	L	-	M	H	M
CO3	L6	M	H	M	M	L	-	-	-	-	L	-	M	M	M
CO4	L2	M	M	M	M	L	-	-	-	-	M	-	L	M	H
CO5	L2	H	M	L	M	L	-	-	-	-	M	-	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSSODECA 513: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem

Course Outcomes:

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

CO1:	Develop their self-confidence, leadership qualities, and their responsibilities towards the commUnity.
CO2:	Have an impact on academic development, personal development, and civic responsibility
CO3:	Understand the value of Social Work.
CO4:	Understand the Significance of Discipline in student's Life
CO5:	Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

Semester–III

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSBSC301	**Discrete Mathematics Structure**	**BSC**	30	70	100	3	-	-	3
BTCSPCC302	Object Oriented Programming	PCC	30	70	100	3	-	-	3
[redacted]	[redacted]	PCC	30	70	100	3	-	-	3
BTCSPCC304	Data Structures and Algorithms	PCC	30	70	100	3	-	-	3
BTCSPCC305	Internet & Web Technology	PCC	30	70	100	3	-	-	3
BTCSPCC306	Software Engineering	PCC	30	70	100	3	-	-	3
PRACTICALS/ VIVA VOCE		**Type**	**Internal Marks**	**External Marks**	**Total**	**L**	**T**	**P**	**Credits**
BTCSPCC307	Data Structures and Algorithms Lab	LC	30	20	50	-	-	1	1
BTCSPCC308	Object Oriented Programming Lab	LC	30	20	50	-	-	1	1
BTCSPCC309	Software Engineering Lab	LC	30	20	50	-	-	1	1
[redacted] 310	[redacted] Lab	LC	30	20	50	-	-	1	1
BTCSPCC311	Internet & Web Technology Lab	LC	30	20	50	-	-	1	1
BTCSPSIT312	Industrial Training / Seminar	[redacted]	30	20	50	-	-	1	1
BTCSSODECA 313	Social Outreach, Discipline & Extra Curricular Activities	[redacted]	50	-	50	-	-	-	1
BTBSC314	ANANDAM	AECC	50	50	100	1	-	1	2
	TOTAL		460	590	1050	19	0	7	27

Semester-IV

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSBSC401	Probability & Optimization Theory	PCC	30	70	100	3	1	0	4
BTCSPCCDS402	Data Science / Python Programming	PCC	30	70	100	3	0	0	3
BTCSPCCDS403	Artificial Intelligence	PCC	30	70	100	2	-	-	2
BTCSPCC404	Database Management System	PCC	30	70	100	3	0	0	3
BTCSPCC405	Theory of Computation	PCC	30	70	100	3	1	0	4
BTCSPCC406	Data Communication and Computer Networks	PCC	30	70	100	3	0	0	3
PRACTICALS/ VIVA VOCE		**Type**	**Internal Marks**	**External Marks**	**Total**	**L**	**T**	**P**	**Credits**
BTCSPCC407	R Lab	LC	30	20	50	0	0	1	1
BTCSPCC408	Database Management System Lab	LC	30	20	50	0	0	1	1
BTCSPCC409	Network Programming Lab	LC	30	20	50	0	0	1	1
BTCSPCC410	Linux Shell Programming Lab	LC	30	20	50	0	0	1	1
BTCSPCC 411	Java Lab	LC	30	20	50	0	0	1	1
BTCSSODECA 412	Social Outreach, Discipline & Extra Curricular Activities		50	-	50	-	-		1
BTBSC 413	ANANDAM	AECC	50	50	100	1	-	1	2
	TOTAL		**430**	**570**	**1000**	**18**	**2**	**6**	**27**

Semester –V

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSPCCDS501	Data Mining & Warehousing	Core	30	70	100	3	-	-	3
BTCSPCCDS502	Deep Learning	Core	30	70	100	3	-	-	3
BTCSPCC 503	Operating System	Core	30	70	100	3	-	-	3
BTCSPCC 504	Computer Graphics & Multimedia	Core	30	70	100	3	-	-	3
BTCSPCC 505	Analysis of Algorithms	Core	30	70	100	3	-	-	3
BTCSPEC 506A	Software Project Management	Elective	30	70	100	3	-	-	3
BTCSPEC 506B	Human-Computer Interaction	Elective	30	70	100	3	-	-	3
BTCSPEC 506C	Bio-informatics	Elective	30	70	100	3	-	-	3
BTCSHSMC507	Professional Skills	HSMC	30	70	100	2	-	-	2
PRACTICALS/ VIVA VOCE		**Type**	**Internal Marks**	**External Marks**	**Total**	**L**	**T**	**P**	**Credits**
BTCSPCCDS508	Data Mining & Warehousing Lab	Core	30	20	50	-	-	1	1
BTCSPCC509	Computer Graphics & Multimedia Lab	Core	30	20	50	-	-	1	1
BTCSPCC 510	Analysis of Algorithms Lab	Core	30	20	50	-	-	1	1
BTCSPCCDS511	Deep Learning Lab	Core	30	20	50	-	-	1	1
BTCSPROJ 512	Industrial Training/ Seminar	PROJ	30	20	50	-	-	1	1
BTCSHSMC 513	Social Outreach, Discipline & Extra Curricular Activities	HSMC	50	-	50				1
BTHSMC514	ANANDAM	AECC	50	50	100	1	-	1	2
	TOTAL		460	640	1100	21	-	6	28

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Semester–III

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSBSC301	Discrete Mathematics Structure	BSC	30	70	100	3	-	-	3
BTCSPCC302	Object Oriented Programming	PCC	30	70	100	3	-	-	3
BTCSPCCDS303	Python Programming	PCC	30	70	100	3	-	-	3
BTCSPCC304	Data Structures and Algorithms	PCC	30	70	100	3	-	-	3
BTCSPCC305	Internet & Web Technology	PCC	30	70	100	3	-	-	3
BTCSPCC306	Software Engineering	PCC	30	70	100	3	-	-	3
PRACTICALS/ VIVA VOCE		**Type**	**Internal Marks**	**External Marks**	**Total**	**L**	**T**	**P**	**Credits**
BTCSPCC307	Data Structures and Algorithms Lab	LC	30	20	50	-	-	1	1
BTCSPCC308	Object Oriented Programming Lab	LC	30	20	50	-	-	1	1
BTCSPCC309	Software Engineering Lab	LC	30	20	50	-	-	1	1
BTCSPCCDS 310	Python Lab	LC	30	20	50	-	-	1	1
BTCSPCC311	Internet & Web Technology Lab	LC	30	20	50	-	-	1	1
BTCSPROJ312	Industrial Training / Seminar	PROJ	30	20	50	-	-	1	1
BTCSHSMC313	Social Outreach, Discipline & Extra Curricular Activities	HSMC	50	-	50	-	-	-	1
BTHSMC314	ANANDAM	AECC	50	50	100	1	-	1	2
	TOTAL		460	590	1050	19	0	7	27

BTBSC301: Discrete Mathematical Structures

Course Objective:

- To develop logical thinking and its application to computer science, especially to emphasize the importance of proving statements correctly
- To develop the concept of number theory.
- To enhances one's ability to reason and ability to present a coherent and mathematically accurate argument.
- To build theoretical concepts behind various higher level concepts such as graphs.
- To learn the concept of group theory and its various applications.

Course Contents:

Unit I: **Notion of proof:** Propositional and predicate logic, proof by counterexample, the contra positive, proof by contradiction, inductive proofs. Propositional and predicate logic

Unit II: **Number Theory**- Divisibility, Euclidean algorithm, prime numbers, Fundamental Theorem of Arithmetic, greatest common divisors, Fermat's little theorem, Congruence's, solution of congruence's, Chinese remainder theorem, Euler's phi function, Quadratic residues and reciprocity, Jacobi Symbol, binary quadratic forms, equivalence and reduction of binary forms, sums of two squares, greatest integer function, arithmetic functions,

Unit III: **Combinatorial number theory:** Basic counting techniques, pigeon-hole principle, recurrence relations, generating functions, Polya's counting theorem. Introduction to probabilistic method in combinatorics, Inclusion-exclusion principle, Techniques of numerical calculation, Public key Cryptography.

Unit IV: **Graph Theory**- Introduction and basic terminology of graphs, Planar graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs, matching, vertex/edge covering.

Unit V: **Algebraic Structures:** Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups,

Text Books:

1. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
2. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.
3. S.B. Singh, Discrete Structures, Khanna Book Publishing Company, 2019.

References:

1. Chartrand, Lesniak, and Zhang. *Graphs and Digraphs*. Fifth Edition. CRC Press. 2010.
2. D. Jungnickel. Graphs, *Networks and Algorithms*, Fourth Edition. Springer. 2013.
3. Douglas B. West. *Introduction to Graph Theory*, Second Edition. Prentice Hall. 2001.
4. I. Niven, H.S. Zuckerman, H. L. Montgomery, *An Introduction to theory of numbers (fifth edition)*, John Wiley & Sons, Inc.
5. Neal Koblitz, *A course in Number theory and Cryptography (second edition)*, Springer-Verlag

Course Outcomes:

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

CO1:	Underline the features of C++ supporting object oriented programming.
CO2:	Describe the relative merits of C++ as an object oriented programming language.
CO3:	Use how to produce object-oriented software using C++.
CO4:	Describe how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.
CO5:	Understand advanced features of C++ specifically stream I/O, templates and operator overloading.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L1	H	M	H	M	H	-	-	-	L	M	L	L	L	L
CO2	L2	H	M	M	M	M	-	-	-	L	M	-	M	M	L
CO3	L3	H	M	L	M	M	-	-	-	L	M	L	L	M	L
CO4	L3	M	M	M	M	M	L	-	-	L	M	-	M	L	M
CO5	L2	H	M	H	H	L	L	-	-	L	M	-	L	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	CO3, CO4, CO5
CD4	Self- learning advice using internets	CO2, CO3, CO5
CD5	Industrial visit	CO4, CO5

BTCSPCCDS 303: Python Programming

Course Objective:

The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.

Course Contents:

Unit I: Python Interpreter, The Interpreter and Its Environment, Control Flow Tools if Statements, for Statements, The range() Function, break and continue Statements, and else Clauses on Loops, pass Statements, Defining Functions, More on Defining Functions.

Unit II: Data Structures : More on Lists , The del statement , Tuples and Sequences, Sets, Dictionaries Looping Techniques, More on Conditions, Comparing Sequences and Other Types.

Unit III: Functions, Modules, Standard Modules, The dir() Function, Packages, Files, Tuple Packing and Unpacking

Unit IV: Input and Output: Fancier Output Formatting , Reading and Writing Files, Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions , Defining Clean-up Actions, Predefined Clean-up Actions

Unit V: Classes : A Word About Names and Objects, Python Scopes and Namespaces, Inheritance, Private Variables, Odds and Ends, Iterators, Generators, Generator Expressions, Standard Library : Operating system Interface, command line Argument, String Pattern matching, Internet access

References:

1. Starting Out with Python (2009) Pearson , Tonny Gaddis
2. Beginning Pyhton Wrox Publication Peter Norton, Alex Samuel
3. Python Algorithms Apress, Magnus Liet Hetland,
4. Python Object Oriented Programming PACKT Press, Dusty Phillips
5. Python for Unix and Linux System Administration O'Relly, Noad Gift

Course Outcomes

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

CO1:	Understand the basics of internet and Working with HTML and scripting.
CO2:	Create web pages using HTML
CO3:	Build dynamic web pages using JavaScript
CO4:	Work with DHTML
CO5:	Work with Forms.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	-	M	-	M	-	M	-	-	H	L	M	L	L
CO2	L3	M	-	L	-	M	-	H	-	-	H	L	M	L	L
CO3	L2	L	-	L	-	M	-	H	-	-	M	-	M	M	M
CO4	L1	M	-	M	-	H	-	M	-	-	M	L	M	L	L
CO5	L2	M	-	M	-	M	L	L	L	-	H	L	L	L	L

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4,CO5
CD2	Tutorials/Assignments	CO1,CO2, CO3, CO4,CO5
CD3	Seminars	CO4, ,CO5
CD4	Self- learning advice using internets	CO1, CO2,CO3, CO4,CO5
CD5	Industrial visit	CO3, CO4,CO5

BTCSPCC 306: Software Engineering

Course Objectives:

- To help students to develop skills that will enable them to construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain.
- To foster an understanding of why these skills are important.

Course Contents:

Unit I Introduction, software life-cycle models, software requirements specification, formal requirements specification, verification and validation.

Unit II Software Project Management: Objectives, Resources and their estimation, LOC and FP estimation, effort estimation, COCOMO estimation model, risk analysis, software project scheduling.

Unit III Requirement Analysis: Requirement analysis tasks, Analysis principles. Software prototyping and specification data dictionary, Finite State Machine (FSM) models. Structured Analysis: Data and control flow diagrams, control and process specification behavioral modeling.

Unit IV Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation.

Unit V Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling. Object Oriented Design: OOD concepts, Class and object relationships, object modularization, Introduction to Unified Modeling Language.

Text/ Reference Books:

- R. S. Pressman, "Software Engineering – A practitioner's approach", McGraw Hill Int. Ed.
- I. Sommerville, "Software Engineering", Addison Wesley, 2004
- Rajib Mall, "Fundamental of Software Engineering", 3rd Edition, PHI Learning Private Limited
- K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers
- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed., New Age International, 2005.
- James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons.
- Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa, 3rd Ed., 2005.

Course Outcomes:

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

CO1:	Understand large scale software development from a broader perspective, and function in multidisciplinary teams.
CO2:	Apply knowledge gained in the course to practical software development situations.
CO3:	Describe software systems to meet desired needs with realistic constraints.
CO4:	Describe software development activities.
CO5:	Discuss contemporary issues in Software development and engage in life-long learning, understand professional and ethical responsibility

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	M	H	M	-	-	-	-	L	L	L	M	H	M
CO2	L3	H	L	M	L	M	-	-	-	M	L	L	M	M	H
CO3	L1	H	M	L	M	M	-	-	-	H	M	-	M	M	M
CO4	L1	M	L	M	L	M	-	-	-	M	L	L	M	H	M
CO5	L2	H	H	H	H	L	-	-	-	M	L	L	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	CO3, CO4, CO5
CD4	Self- learning advice using internets	CO2, CO3, CO5
CD5	Industrial visit	CO4, CO5

BTCSPCC-307: Data Structures and Algorithms Lab

Course Objectives:

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

List of Experiments:

S.No.	*List of Exercises*
1	Write a program to insert an element at desire position in the array.
2	Write a program to delete an element at desire position from the array.
3	Write a program to replace an element at desire position in the array.
4	Write a program to search (linear search) an element in the array.
5	Write a program to search (binary search) an element in the array.
6	Write a program to addition and multiply of two matrices.
7	Write a program to implementation of stack using array.
8	Write a program to implementation of queue using array.
9	Write a program to implementation link list.
10	Write a program that sorts the array through Bubble sort.
11	Write a program that sorts the array through Quick sort.
12	Write a program that sorts the array through Merge sort.
13	Write a program that sorts the array through Insertion sort.
14	Write a program to BST (binary search tree) addition, deletion and searching.

Course Outcomes:

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

CO1:	Apply OOPs features to program design and implementation.
CO2:	Create Classes according to the problem and implement programs in C++
CO3:	Implement Object Oriented Programs using templates and exceptional handling concepts.
CO4:	Perform console operations, applications and file handling.
CO5:	Implement applications using C++.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L3	H	M	H	M	M	-	-	-	L	L	-	L	M	M
CO2	L6	M	M	H	M	L	-	-	-	M	L	-	L	M	M
CO3	L3	M	M	H	M	L	-	-	-	L	M	-	L	H	L
CO4	L3	H	H	H	H	-	-	-	-	M	M	-	L	M	M
CO5	L3	H	M	H	M	M	-	-	-	M	L	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	CO4
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	CO5

BTCSPCC 309: Software Engineering Lab

Course Objective:

- To help students to develop skills that will enable them to construct software of high quality software that is reliable and reasonably also easy to understand, modify and maintain.
- To foster an understanding of why these skills are important.

Tool Required: Rational Rose Enterprise Edition

List of Experiments:

1. Development of requirements specification, function oriented design using/SD, object-oriented design using UML, test case design, and implementation using Java and testing. Use of appropriate CASE tools and other tools such as configuration management tools, program analysis tools in the software lifecycle.
2. Develop Software Requirements Specification (SRS) for a given problem in IEEE template.
3. Develop DFD model (level-0, level-1 DFD and Data dictionary) of the project.
4. Develop structured design for the DFD model developed.
5. Developed all Structure UML diagram of the given project.
6. Develop Behavior UML diagram of the given project.

Course Outcomes:

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

CO1: Create, Test and Debug Python Programs

CO2: Implement Conditionals and Loops for Python Programs

CO3: Use functions and represent Compound data using Lists, Tuples and Dictionaries

CO4: Read and write data from & to files in Python and develop Application using Python.

CO5: Illustrate sort methods in Python Programs.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	M	M	M	M	-	-	-	L	M	L	L	M	M
CO2	L3	M	M	M	M	L	-	-	-	M	M	L	M	H	M
CO3	L2	H	L	H	L	M	-	-	-	L	L	L	M	H	H
CO4	L6	H	M	H	M	M	-	-	-	M	M	M	L	H	H
CO5	L3	M	M	M	M	L	-	-	-	M	M	L	M	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4,CO5
CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	-
CD4	Self- learning advice using internets	CO2, CO3, CO4
CD5	Industrial visit	-

BTCSPCC 311: Internet & Web Technology Lab

Course Objective:

- To design web development Software and to understand web technologies.
- To make student able for designing and developing the web applications.

List Of Experiments

1. Write a program to display different stylo of heading text?
2. Develop and demonstrate a HTML document that illustrates the use external style sheet, ordered list, table, borders, padding, color, and the tag
3. Write an html code for creates the ordered list.
4. Web page creation with all types of cascading style sheets.
5. Create a html registration form and to validate the form using JavaScript code.
6. Create a web page that displays college information using various style sheets.
7. To write a JavaScript program to define a user defined function for sorting the values in an array.
8. Create a web page with field username, password, date of birth, email, and gender contact no.
9. Create a webpage to demonstrate the validation.

BTCSHSMC 313: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem

Course Outcomes:

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

CO1:	Develop their self-confidence, leadership qualities, and their responsibilities towards the community.
CO2:	Have an impact on academic development, personal development, and civic responsibility
CO3:	Understand the value of Social Work
CO4:	Understand the Significance of Discipline in student's Life
CO5:	Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs,

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

BTBSC 314: ANANDAM

Objectives:

- To instill the joy of giving in young people, turning them into responsible citizens to build up a better society.
- To inculcate the habit of service in students across the University.
- A compulsory course of 2 credits per semester to be included in each program of University.
- Students to be expected to engage in individual and group acts of service and goodness.

Action Plan:

Students will be expected to

- Do at least one act of individual service each day
- Record this act of service in a dedicated Register / Personal Diary
- Share this Register / Personal Diary day in the Anandam Class scheduled per week. The class interaction will include Personal Diary check, Showing of Community based motivation videos, Community based presentations by students, Role playing etc.
- Undertake one group service project for 64 hours every semester (outside college hours)
- Upload the report on the group project on the Anandam platform
- Participate in a sharing and presentation on the group service in the discussion sessions held once in week
- There will be some suggested projects and organizations that students can work with. Students can also suggest their own projects which others can join

Each student will finish the year with a portfolio of giving. This will include their Register / Personal Diaries and their reports on group service projects.

Semester-IV

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTCSBSC401	Probability & Optimization Theory	PCC	30	70	100	3	1	0	4
BTCSPCCDS402	Data Science with R Programming	PCC	30	70	100	3	0	0	3
BTCSPCCDS403	Artificial Intelligence	PCC	30	70	100	2	-	-	2
BTCSPCC404	Database Management System	PCC	30	70	100	3	0	0	3
BTCSPCC405	Theory of Computation	PCC	30	70	100	3	1	0	4
BTCSPCC406	Data Communication and Computer Networks	PCC	30	70	100	3	0	0	3
PRACTICALS/ VIVA VOCE		**Type**	**Internal Marks**	**External Marks**	**Total**	**L**	**T**	**P**	**Credits**
BTCSPCCDS 407	R Lab	LC	30	20	50	0	0	1	1
BTCSPCC408	Database Management System Lab	LC	30	20	50	0	0	1	1
BTCSPCC409	Network Programming Lab	LC	30	20	50	0	0	1	1
BTCSPCC410	Linux Shell Programming Lab	LC	30	20	50	0	0	1	1
BTCSPCC411	Java Lab	LC	30	20	50	0	0	1	1
BTCSHSMC 412	Social Outreach, Discipline & Extra Curricular Activities	HSMC	50	-	50	-	-		1
BTHSMC413	ANANDAM	AECC	50	50	100	1	-	1	2
	TOTAL		430	570	1000	18	2	6	27

BTCSBSC401: Probability & Optimization Theory

Course Objective:

- To learn basics of probability.
- To understand and apply discrete and continuous instances along with real world phenomenon of standard distributions.
- To understand the concept of correlation and analysis of regression.
- To understand and apply the optimization theory.
- To understand Transportation and assignment problems.

Course Content:

Unit I : PROBABILITY AND RANDOM VARIABLES: Introduction to probability, Axioms of probability - Conditional probability - Total probability – Baye's theorem, Random variable - Probability mass function - Probability density function - Properties – Moments - Moment generating functions and their properties.

Unit II :Distributions: Binomial, Poisson, Geometric, Uniform, Exponential, Weibull and Normal distributions and their properties. Joint distributions - Marginal and conditional distributions. Transformation of random variables - Central limit theorem

Unit III: Correlation and Regression Analysis:– Covariance – Correlation and regression . Curve fitting. Line of Regression, Curve fitting. Line of Regression

Unit IV : Linear Programming: Simplex method, Two Phase Method and Duality in Linear Programming.

UnitV: Application of Linear Programming: Transportation Problems, North-West Corner rule, Vogle's approximation method, and Assignment Problems: Hungarian Method. Job Sequencing.

Text Books:

1. Ross, S., "A first course in probability", 9th Edition, Pearson Education, Delhi, 2019.
2. Medhi J., "Stochastic Processes", New Age Publishers, New Delhi, 2017. (Chapters 2, 3,4)
3. T. Veerarajan, "Probability, Statistics and Random process", Second Edition, Tata McGraw Hill, New Delhi, 2017.

Reference Books:

1. Allen A.O., "Probability, Statistics and Queuing Theory", Academic press, New Delhi, 2010.
2. Taha H. A., "Operations Research-An Introduction", Seventh Edition, Pearson Education Edition Asia, Delhi, 2014.

7. Advanced R: Data Programming and the Cloud by by: Matt Wiley,Joshua F. Wiley.
8. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython ,2nd edition, Wes McKinney, O'Reilly Media (2017)

Course Outcomes:

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

CO1:	To Explain basic Statistics and Basics of Data Science.
CO2:	To identify probability distributions commonly used as foundations for statistical modeling. Fit a model to data.
CO3:	To Using R to carry out basic statistical modeling and analysis.
CO4:	To Explain the significance of exploratory data analysis (EDA) in data science. Apply basic tools (plots, graphs, summary statistics) to carry out EDA.
CO5:	To Describe the Data Science Process and how its components interact via machine learning models.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	M	M	M	M	-	-	-	-	M	-	M	M	L
CO2	L1	H	H	H	H	L	-	-	-	-	H	-	L	M	M
CO3	L1	H	L	L	L	L	-	-	-	-	L	-	H	H	M
CO4	L6	H	H	H	H	L	-	-	-	-	H	-	L	M	L
CO5	L2	H	L	L	L	M	-	-	-	-	L	-	M	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO4, CO5

CD3	Seminars	CO3, CO4
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	CO2

BTCSPCCDS403: Artificial Intelligence

Course Objective:

- To introduce the basic principles, techniques, and applications of Artificial Intelligence.
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.

Course Contents:

Unit I: Introduction to AI and Intelligent agent: Different Approach of AI, Problem Solving : Solving Problems by Searching, Uninformed search, BFS, DFS, Iterative deepening, Bi directional search, Hill climbing, Informed search techniques: heuristic, Greedy search, A* search, AO* search, constraint satisfaction problems.

Unit II: Game Playing: Minimax, alpha-beta pruning, jug problem, chess problem, tiles problem

Unit III: Knowledge and Reasoning: Building a Knowledge Base: Propositional logic, first order logic, situation calculus. Theorem Proving in First Order Logic.Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks

Unit IV: Learning: Overview of different forms of learning, Supervised base learning Learning Decision Trees, SVM, Unsupervised based learning, Market Basket Analysis, Neural Networks.

Unit V: Introduction to Natural Language Processing: Different issue involved in NLP, Expert System, Robotics.

Text/ Reference Books:

- E.Rich,K Knight-Artificial Intelligence,Tata McGraw Hills.
- S.Russell,P Norving-Artificial Intelligence-A Modern Approach, Pearson Education Asia.

SQL queries programming and Triggers: The Forms of a Basic SQL Query, Union, and Intersection and Except, Nested Queries, Correlated Nested Queries, Set-Comparison Operations, Aggregate Operators, Null Values and Embedded SQL, Dynamic SQL, ODBC and JDBC, Triggers and Active Databases.

Unit IV: **Schema refinement and Normal forms:** Introductions to Schema Refinement, Functional Dependencies, Boyce - Codd Normal Forms, Third Normal Form, Normalization-Decomposition into BCNF Decomposition into 3-NF.

Unit V: **Transaction Processing:** Introduction-Transaction State, Transaction properties, Concurrent Executions. Need of Serializability, Conflict vs. View Serializability, Testing for Serializability, Recoverable Schedules, Cascadeless Schedules. **Concurrency Control:** Implementation of Concurrency: Lock-based protocols, Timestamp-based protocols, Validation-based protocols, Deadlock handling, Database Failure and Recovery: Database Failures, Recovery Schemes: Shadow Paging and Log-based Recovery, Recovery with Concurrent transactions.

References:

1 Date C J, "An Introduction to Database System", Addision Wesley.

2 Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill

3 Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley

4 Leon & Leon, "Database Management System", Vikas Publishing House.

5 Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication

6 Ramakrishnan, Gehrke, "Database Management System", McGraw Hill

7 Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson.

Course Outcomes:

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

CO1:	Describe given query write relational algebra expressions for that query and optimize the developed expressions
CO2:	Understand given specification of the requirement design the databases using E-R method and normalization.
CO3:	Understand given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
CO4:	Demonstrate given query optimize its execution using Query optimization algorithms
CO5:	Discuss a given transaction-processing system; determine the transaction atomicity, consistency, isolation, and durability.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L1	H	L	M	L	H	-	-	-	L	L	L	M	M	M
CO2	L2	H	M	M	M	M	-	-	-	-	M	L	L	M	M
CO3	L2	H	L	M	L	H	-	-	-	-	L	L	M	M	M
CO4	L3	H	H	H	H	M	-	-	-	L	H	L	L	H	M
CO5	L2	H	H	M	H	M	-	-	-	L	H	M	L	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO4, CO5
CD3	Seminars	CO3, CO4

BTCSPEC 506 A: Software Project Management

Course Objective:-

- To understand the Software Project Planning and Evaluation techniques.
- To plan and manage projects at each stage of the software development life cycle (SDLC).
- To learn about the activity planning and risk management principles.
- To manage software projects and control software deliverables.
- To develop skills to manage the various phases involved in project management and people management.
- To deliver successful software projects that support organization's strategic goals.

Course Contents:

Unit I **Project Evaluation and Project Planning:** Importance of Software Project Management – Activities – Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

Unit II **Project Life Cycle and Effort Estimation:** Software process and Process Models – Choice of Process models – Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II – a Parametric Productivity Model.

Unit III **Activity Planning and Risk Management:** Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules

Unit IV **Project Management and Control:** Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

Unit V **Staffing in Software Projects:** Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

Text Book:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

References:

1. Robert K. Wysocki —Effective Software Project Management – Wiley Publication, 2011.
2. Walker Royce: —Software Project Management- Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, —Managing Global Software Projects – McGraw Hill Education (India), Fourteenth Reprint 2013.

Course Outcomes:

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

CO1:	Understand Project Management principles while developing software.
CO2:	Gain extensive knowledge about the basic project management concepts, framework and the process models.
CO3:	Obtain adequate knowledge about software process models and software effort estimation techniques.
CO4:	Estimate the risks involved in various project activities.
CO5:	Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	H	L	H	L	-	-	-	-	H	-	H	L	L
CO2	L2	H	H	H	H	M	-	-	-	-	H	-	H	L	L
CO3	L3	H	M	H	M	M	-	-	-	-	M	-	L	L	M
CO4	L2	L	M	H	M	L	-	-	-	-	M	-	H	H	M
CO5	L2	L	H	M	M	L	-	-	-	-	M	-	H	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO5
CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	CO3 ,CO4
CD4	Self- learning advice using internets	CO2,CO3
CD5	Industrial visit	-

BTCSPEC 506 C: Bioinformatics

Course Objectives:

- To use bioinformatics in your own work.
- To Build a solid foundation and acquire the vocabulary you need to supervise or to communicate with others who use these tools.

Course Contents:

Unit I: Introduction: Basics of biology.

Unit II Sequences: Problem Statement, Edit distance and substitution matrices, HMMs and pairwise HMMs, Global and local alignments, Spliced alignment, Space-efficient sequence alignment, multiple alignment, Database searching tools, Sequence by hybridization, Profile HMMs

Unit III: Structures: Protein structure alignment, Protein structure prediction

Unit IV: Phylogenetic trees: Large parsimony and small parsimony problems, Probabilistic approaches, Grammar-based approaches

Unit V: Miscellaneous topics: Pathways and networks, Microarrays, Biomedical images

Text/Reference Books:

- Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications. Oxford University Press.
- Pevsner J. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell. Campbell A. M., Heyer L. J. (2006)
- Discovering Genomics, Proteomics and Bioinformatics. II Edition. Benjamin Cummings.

B.Tech. CSE (Data Science) 2022-26

Course Outcomes

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

CO1:	Describe the basic concepts of Bioinformatics and its significance in Biological data analysis.
CO2:	Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
CO3:	Explain about the methods to characterize and manage the different types of Biological data.
CO4 :	Define different types of Biological Databases.
CO5 :	Discuss basics of sequence alignment and analysis.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L2	H	M	M	M	L	-	-	-	-	M	-	L	L	L
CO2	L2	H	L	M	L	L	-	-	-	-	L	-	M	L	L
CO3	L2	H	H	M	H	L	-	-	-	-	H	-	L	L	M
CO4	L1	H	M	-	M	L	-	-	-	-	M	-	M	M	M
CO5	L2	H	L	M	L	L	-	-	-	-	L	-	M	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3,CO4,CO5
CD2	Tutorials/Assignments	CO2, CO3,CO4
CD3	Seminars	CO4,CO5
CD4	Self- learning advice using internets	CO3, CO4,CO5
CD5	Industrial visit	-

CO1	L6	L	H	L	M	L	H	H	M	-	H	M	-	L	L
CO2	L3	L	H	L	M	L	H	H	M	-	H	M	-	L	L
CO3	L3	L	H	L	M	L	H	H	M	-	H	M	-	L	M
CO4	L3	L	H	L	M	L	H	H	M	-	H	M	-	L	M
CO5	L3	L	H	L	M	L	H	H	M	-	H	M	-	L	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2
CD2	Tutorials/Assignments	CO1, CO2, CO3
CD3	Seminars	CO3, CO4
CD4	Self- learning advice using internets	CO1, CO2, CO3, CO4
CD5	Industrial visit	CO3, CO4, CO5

BTCSPCCDS 508: Data Mining & Warehousing Lab

COURSE OBJECTIVES:

1. Learn how to build a data warehouse and query it (using open source tools like Pentaho Data Integration Tool, Pentaho Business Analytics).
2. Learn to perform data mining tasks using a data mining toolkit (such as open source WEKA)
3. Understand the data sets and data preprocessing.
4. Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression.
5. Exercise the data mining techniques with varied input values for different parameters.
6. To obtain Practical Experience Working with all real data sets.

List of Experiments:

1. Installation of WEKA Tool
   1. Create an Employee Table with the help of Data Mining Tool WEKA
   2. Create a Weather Table with the help of Data Mining Tool WEKA
2. OLAP Cube and its different operations
3. Creating a new ARFF file
   1. Case Study: Create Student. ariff file to suggest better college using Decision tree
   2. Case Study: Create Placement . ariff file to identify the students who are eligible for placements using KNN
4. Pre-Processes Techniques on Data Set
   1. Pre-process a given dataset based on Handling Missing Values
   2. Apply Pre-Processing techniques to the training data set of Weather Table.
   3. Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
   5. Generate Association Rules using the Apriori Algorithm
   6. Generating association rules using fp growth algorithm
   7. Build a Decision Tree by using J48 algorithm
   8. Naive bayes classification on a given data set
   9. Applying k-means clustering on a given data set
   10. Calculating Information gains measure
   11. OLAP Cube and its different operations

Course Outcomes

Course Outcomes

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

CO1:	List the basic concepts used in computer graphics.
CO2:	Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
CO3:	Describe the importance of viewing and projections.
CO4:	Define the fundamentals of animation, virtualreality and its related technologies.
CO5:	Implement various algorithms to Fractal images, dimensional objects and Scenes

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L3	H	H	M	H	L	-	-	-	-	H	-	L	M	M
CO2	L3	H	L	M	L	M	-	-	-	-	L	-	M	H	M
CO3	L2	H	H	M	H	L	-	-	-	-	H	-	L	H	M
CO4	L1	H	M	H	M	H	-	-	-	-	M	-	L	H	M
CO5	L1	H	M	M	M	H	-	-	-	-	L	-	L	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	-
CD4	Self- learning advice using internets	CO2, CO3,CO4
CD5	Industrial visit	

BTCSPCC 510: Analysis of Algorithms Lab

Course Objective:

- To Design and implement efficient algorithms for a specified application.
- To Strengthen the ability to identify and apply the suitable algorithm for the given real world problem.

List of Experiments:

1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2. Implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3. a. Obtain the Topological ordering of vertices in a given digraph. b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
4. Implement 0/1 Knapsack problem using Dynamic Programming.
5. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
6. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
7. a. Print all the nodes reachable from a given starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method.
8. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
9. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.
10. Implement N Queen's problem using Back Tracking.

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L2	H	M	L	M	L	L	-	-	L	M	-	L	L	M
CO2	L4	H	M	L	M	L	L	-	-	-	M	-	L	L	M
CO3	L1	H	M	L	M	L	L	-	-	L	M	-	L	L	L
CO4	L3	H	H	M	H	L	L	-	-	L	H	-	M	M	M
CO5	L2	H	M	M	M	L	L	-	-	L	M	-	M	L	L

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4 ,CO5
CD2	Tutorials/Assignments	CO1,CO2, CO3, CO4,CO5
CD3	Seminars	CO2
CD4	Self- learning advice using internets	CO1,CO2, CO3, CO4
CD5	Industrial visit	CO5

BTCSPSIT 512: Industrial Training / Seminar

Course Objectives:

- To acquire and apply fundamental principles of engineering
- To update with all the latest changes in technological world.
- To identify, formulate and model problems and find engineering solution based on a systems approach.

Course Outcomes:

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

CO1:	Capability to acquire and apply fundamental principles of engineering.
CO2:	Become master in one's specialized technology
CO3:	Become updated with all the latest changes in technological world.
CO4:	Ability to identify, formulate and model problems and find engineering solution based on a systems approach.
CO5:	Ability to understand the real problems of world and use the models to solve it.

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L2	M	H	L	H	L	-	-	-	-	L	-	L	M	M
CO2	L3	M	L	H	H	L	-	-	-	-	L	-	M	H	M
CO3	L6	M	H	M	M	L	-	-	-	-	L	-	M	M	M
CO4	L2	M	M	M	M	L	-	-	-	-	M	-	L	M	H
CO5	L2	H	M	L	M	L	-	-	-	-	M	-	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

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Mechanical Engineering

Newly Introduced Subjects in B Tech ME 2023-24

Name of the Program	Program Code	Name of New Course	Course Code
B. Tech (ME)	BT141	Basic Electronics Engineering	BTMEESC302
B. Tech (ME)	BT141	Facility planning & material handling	BTMEVAC407
B. Tech (ME)	BT141	Manufacturing Automation	BTMEPCC505
B. Tech (ME)	BT141	Industrial Psychology	BTMEHSMC506.A

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SEMESTER: III

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTMEBSC301	Engineering Mathematics-III	BSC	30	70	100	3	-	-	3
BTMEBSC302	[redacted]	BSC	30	70	100	3	-	-	3
BTMEESC303	Engineering Mechanics	ESC	30	70	100	3	1	-	4
BTMEPCC304	Engineering Thermodynamics	PCC	30	70	100	3	-	-	3
BTMEPCC305	Materials Science and Engineering	PCC	30	70	100	3	-	-	3
BTMEPCC306	Mechanics of Solids	PCC	30	70	100	3	1	-	4
BTMEHSMC307	Fundamentals of Indian Knowledge System	HSMC	30	70	100	2	-	-	2
PRACTICALS/ VIVA VOCE		Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTMEPCC308	Machine drawing practice	LC	60	40	100	-	-	1	1
BTMEPCC309	Materials Testing Lab	LC	60	40	100	-	-	1	1
BTMEPCC310	Basic Mechanical Engineering Lab	LC	60	40	100	-	-	1	1
BTMEESC311	Basic Electronics Engineering Lab	LC	60	40	100	-	-	1	1
BTMEPROJ312	Industrial Training/Seminar	PROJ	60	40	100	-	-	-	1
BTMEHSMC 313	Social Outreach, Discipline & Extra Curricular Activates	HSMC	100	-	100			-	1
TOTAL			610	690	1300	28	2	4	28

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BTMEESC302: Basic Electronics Engineering

Objectives:

To acquire the basic knowledge of digital logic levels and their application

To prepare students to perform the analysis and design of various digital electronic circuits

Course Contents:

Unit I **Introduction:** Objective, scope and outcome of the course. Semiconductor Devices and Applications: Introduction to P-N junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, capacitor filter. Zener diode and its characteristics, Zener diode as voltage regulator. Regulated power supply IC based on 78XX and 79XX series, Introduction to BJT, its input-output and transfer characteristics, BJT as a single stage CE amplifier, frecuency response and bandwidth.

Unit II **Operational amplifier and its applications:** Introduction to operational amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, op-amp with negative feedback, study of practical op-amp IC 741, inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

Unit III **Timing Circuits and Oscillators:** RC-timing circuits, IC 555 and its applications as table and mono-stable multi-vibrators, positive feedback, Barkhausen's criteria for oscillation, R-C phase shift and Wein bridge oscillator.

Unit IV **Digital Electronics Fundamentals:** Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, de-multiplexers, flip-flops, shift registers, counters, Block diagram of microprocessor/microcontroller and their applications.

Unit V **Electronic Communication Systems:** The elements of communication system, IEEE frequency spectrum, Transmission media: wired and wireless, need of modulation, AM and FM modulation schemes, Mobile communication systems: cellular concept and block diagram of GSM system.

Reference/Suggested Books:

1. T.M. Floyd, R.P. Jain-Digital fundamentals, Pearson Education.
2. Morris and Mano - Digital logic and Computer Design, Prentice – Hall of India
3. R.P. JAIN: Modern Digital Electronics 4/e, TMH.
4. Kharate G K : Digital Electronics, Oxford
5. Pedroni -Digital Electronics & Design, ELSEVIER.
6. Balbir Kumar and Shail B.Jain, "Electronic Devices and Circuits" PHI,

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Course Outcomes:

Upon completion of this course, students will be:

CO1: Understand different type of codes and number systems which are used in digital transmission and computer systems.

CO2: Apply the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.

CO3: Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.

CO4: Design different types of with and without memory element digital electronic circuits for particular operation, within the real time of economic, performance, efficiency, user friendly and environmental constraints.

CO5: Assess the nomenclature and technology in the area of various memory devices used and apply the memory devices in different types of digital circuits for real world application.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars / Presentations
CD4	Project Discussions
CD5	Self- learning advice using internets

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L2	H	M	M	M	L	-	-	-	L	M	-	L	M	M
CO2	L3	M	L	L	L	M	-	-	-	-	L	-	L	L	H
CO3	L4	H	L	L	L	-	-	-	-	-	L	-	L	M	M
CO4	L6	M	M	M	M	-	-	-	-	-	M	-	L	M	H
CO5	L5	M	L	L	L	M	-	-	-	-	L	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3, CO4, CO5
CD3	Seminars / Presentations	CO3, CO4, CO5
CD4	Project Discussions	CO2, CO3, CO4, CO5
CD5	Self- learning advice using internets	CO2, CO4, CO5

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Semester-IV

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTMEBSC401	Probability and Sampling Theory	BSC	30	70	100	3	-	-	3
BTMEHSMC402	Critical Thinking	HSMC	30	70	100	2	-	-	2
BTMEPCC403	I C Engine	PCC	30	70	100	3	-	-	3
BTMEPCC404	Fluid Mechanics & Fluid Machines	PCC	30	70	100	3	1	-	4
BTMEPCC405	Manufacturing Processes	PCC	30	70	100	3	-	-	3
BTMEPCC406	Theory Of Machines	PCC	30	70	100	3	1	-	4
BTMEVAC407	[redacted]	VAC	30	70	100	2	-	-	2
PRACTICALS/ VIVA VOCE		Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTMEPCC408	I C Engine Lab	LC	60	40	100	-	-	1	1
BTMEPCC409	Fluid Mechanics Lab	LC	60	40	100	-	-	1	1
BTMEPCC410	Production Practice Lab	LC	60	40	100	-	-	1	1
BTMEPCC411	Theory Of Machine Lab	LC	60	40	100	-	-	1	1
BTMEHSMC 412	Social Outreach, Discipline & Extra Curricular Activates	HSMC	100	-	100	-	-	-	1
TOTAL			550	650	1200	19	3	4	26

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BTMEVAC407: Facility Planning & Material Handling

Course Objectives:

- To understand the overall facilities planning process
- To educate product, process and schedule design and their effects on the facility layout
- To introduce concepts of material handling and safety in industries

Course Contents:

Unit I Design of layout of factories, Office, Storage area etc. on consideration of facilities of working people, Storage facilities and general equipment for amenities of working people – Product, Process and combination layout –Systematic layout planning, Design of Assembly lines, Line balancing methods

Unit II Computer applications in layout designs, Environmental aspects like lighting, Ventilation, dust control, humidity. Different type of Plant services like steam compressed air etc

Unit III Plant safety, Elements off Industrial safety- Causes and prevention of accidents – Pollution and environmental consideration

Unit IV Introduction of Material Handling systems, Material Handling principles, Classification of Material Handling Equipment, Relationship of material handling to plant layout.

Unit V Methods to minimize cost of material handling- Maintenance of Material Handling Equipments, Safety in handling, Ergonomics of Material Handling equipment. Design, Miscellaneous equipment

Reference/Suggested Books:

1. A W Peymberton, Plant layout and Material Handling, John Wiley
2. James A Apple, Plant layout and Material Handlin, Krieger Pub Co,1998
3. John A Schbin, Plant layout and Material Handling
4. K C Arora & Shinde, Aspects of Material handling, Lakshmi Publications
5. P B Mahapatra, Operations Management, PHI, 2010

Course Outcomes:

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

CO1: Assess the value of facility planning on the strategy of a firm

CO2: Develop a systematic plant layout

CO3. Know the environmental and economical aspects in facilities planning

CO4. Understand various material handling systems

CO5. Understand minimization of cost involved in material handling.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L6	H	H	H	H	M	L	-	-	-	L	-	L	H	M
CO2	L4	H	H	H	H	M	-	-	-	-	L	-	L	H	M
CO3	L3	H	H	H	H	M	-	-	-	-	L	-	L	H	M
CO4	L5	H	M	H	M	M	L	-	-	-	L	-	L	M	H
CO5	L2	H	M	H	M	M	-	-	-	-	L	-	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO1,CO2, CO3, CO4, CO5
CD3	Seminars	CO3, CO4
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	-

Semester-V

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTMEESC501	Mechatronics Systems	PCC	30	70	100	3	-	-	3
BTMEPCC502	Heat Transfer	PCC	30	70	100	3	-	-	3
BTMEPCC503	Manufacturing Technology	PCC	30	70	100	3	-	-	3
BTMEPCC504	Design Of Machine Elements I	PCC	30	70	100	3	-	-	3
BTMEPCC505	[redacted]	PCC	30	70	100	3	-	-	3
BTMEHSMC506.A	[redacted]	HSMC (Elective I)	30	70	100	3	-	-	3
BTMEHSMC506.B	Operations Research								
BTHSMC 507	Professional Skills	HSMC	30	70	100	2	-	-	2
PRACTICALS/ VIVA VOCE		Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTMEPCC508	Mechatronics Lab	LC	60	40	100	-	-	1	1
BTMEPCC509	Heat Transfer Lab	LC	60	40	100	-	-	1	1
BTMEPCC510	Production Engineering Lab	LC	60	40	100	-	-	1	1
BTMEPCC511	Machine Design Practice Lab	LC	60	40	100	-	-	1	1
BTMEPROJ512	Industrial Training/ Seminar	PRJ	60	40	100	-	-	1	1
BTMEHSMC 513	Social Outreach, Discipline & Extra Curricular Activities	HSMC	100	-	100	-	-	-	1
TOTAL			610	690	1300	20	0	5	26

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BTMEPCC505: Manufacturing Automation

Course Objectives:

- To understand the importance of automation in the of field machine tool based manufacturing
- To get the knowledge of various elements of manufacturing automation – CAD/CAM, sensors, pneumatics, hydraulics and CNC

Course Contents:

Unit I **Introduction:** Definition; Reasons for automating; Strategies; Types of automation; Numerical control (NC, CNC, DNC); Introduction to CNC programming and computer-aided process planning.

Machine and Process Automation: CNC machines, Automated flow lines (types, selection); Work part transport and transfer mechanisms; Feedback systems and control; Modular and reconfigurable machines, adaptive machine controls.

Unit II **Automated Assembly Systems:** Historical developments; Choice of assembly methods; Design for automated assembly; Transfer systems; Vibratory and non-vibratory feeders; Feed tracks, part orienting and placing mechanisms.

Unit III **Factory Automation:** Lean manufacturing, Automation scalability (fixed, programmable, flexible and reconfigurable); Design and analysis of automated flow lines; Average production time, production rate, line efficiency; Analysis of transfer lines without storage; Partial and full automation.

Unit IV **Automation Tools and Techniques:** Mechanical, electro-mechanical, pneumatic and hydraulic systems; Sensors integration; Process monitoring, data analysis and control using actuators; Robots (pick, place, assembly, welding, painting, etc.); Automatic Guided Vehicles; Automated inspection and measurement (CMM and 3D Scanning); Machine vision, AI and machine learning; Human- machine interfaces; Examples and case studies.

Unit V **Advanced Automation Trends:** Digital, inclusive, smart and distributed manufacturing; Industry 4.0; Digital transformations in shop-floors (CIM to Smart factory; Intelligent machines to Smart Machines; Factory automation to Distributed automation; Human sense to system sensed).

Suggested Text / Reference Books:

1. M. P. Groover, Automation, Production Systems and Computer-integrated Manufacturing, Prentice Hall, 2018.
2. S. Kalpakjian and S. R. Schmid, Manufacturing – Engineering and Technology, Pearson.
3. Yoram Koren, Computer Control of Manufacturing Systems, McGraw Hill, 2005
4. CAD/CAM Principles and Applications, P.N. Rao, Tata McGraw Hill, 2010.

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Course Outcomes:

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

CO1: To understand the importance of automation in manufacturing value chain
CO2: To get the knowledge of various elements of automation tools and techniques
CO3: To understand the emerging digital manufacturing trends
CO4: To understand human- machine interfaces
CO5: To understand factory automation to distributed automation

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L2	H	H	H	H	H	-	-	-	-	H	-	L	M	H
CO2	L3	H	M	H	M	M	-	-	-	-	M	-	L	M	M
CO3	L6	H	H	H	H	M	-	-	-	-	H	-	L	H	M
CO4	L2	H	H	H	H	M	-	-	-	-	H	-	L	M	M
CO5	L2	H	M	H	M	M	-	-	-	-	M	-	L	L	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO1,CO2, CO3, CO4, CO5
CD3	Seminars	CO1, CO2, CO3, CO4, CO5
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	CO1, CO2, CO3, CO4, CO5

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BTMEHSMC506.A: Industrial Psychology

Course Objectives:

- To develop an awareness of the major perspectives underlying the field of Industrial Psychology
- To understanding for the potential Industrial Psychology has for society and organizations now and in the future.

Course Contents:

Unit I: The role of the psychologist in industry, the field of occupational Psychology: Study of behavior in work situation and applications of Psychological principles to problems of selection, Placement, Counseling and training

Unit II: Design of Work Environments: Human engineering and physical environment techniques of job analysis, Social environment: Group dynamics in Industry Personal psychology, Selection, training, placement, promotion, counseling, job motivations, job satisfaction. Special study of problem of fatigue, boredom and accidents

Unit III: Understanding Consumer Behavior: Consumer behaviour, study of consumer preference, effects of advertising, Industrial morale: The nature and scope of engineering psychology, its application to industry

Unit IV: Test of Psychology Effectiveness of these tests, Measures to control the tests steps to improve the psychology

Unit V: Individual and group behavior Interaction and psychology involved in individuals; Improving psychology; Group Dynamics

Suggested Text / Reference Books:

1. Aamodt, M.G. (2007) Industrial/Organizational Psychology: An Applied Approach (5th edition) Wadsworth/Thompson: Belmont, C.A.2. Aswathappa K. (2008). Human Resource Management (Fifth edition) New Delhi: Tata McGraw Hill

Course Outcomes:

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

CO1: Understand key concepts, theoretical perspectives, and trends in industrial psychology

CO2: To Evaluate the problems thorough and systematic competency model.

CO3: To understand problems present in environment and design a job analysis method.

CO4: To understand a better work environment for better performance

CO5: To understand and design a performance appraisal process and form for the human behavior.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Industrial visit

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	L2	H	H	H	H	H	-	-	-	-	H	-	L	M	H
CO2	L3	H	M	H	M	M	-	-	-	-	M	-	L	M	M
CO3	L6	H	H	H	H	M	-	-	-	-	H	-	L	H	M
CO4	L2	H	H	H	H	M	-	-	-	-	H	-	L	M	M
CO5	L2	H	M	H	M	M	-	-	-	-	M	-	L	L	M

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO1,CO2, CO3, CO4, CO5
CD3	Seminars	CO1, CO2, CO3, CO4, CO5
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	CO1, CO2, CO3, CO4, CO5

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Semester - VI

Code	Subject/Paper	Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTMEESC601	Measurement & Metrology	PCC	30	70	100	3	-	-	3
BTMEPCC602	Computer Aided Design & Analysis	PCC	30	70	100	3	-	-	3
BTMEPCC603	Mechanical Vibrations	PCC	30	70	100	3	-	-	3
BTMEPCC604	Design of Machine Elements II	PCC	30	70	100	3	-	-	3
BTMEPCC605	Research Methodology	PCC	30	70	100	3	-	-	3
BTMEHSMC606.A	Project Management	HSMC (Elective II)	30	70	100	3	-	-	3
BTMEHSMC606.B	Finance & Accounting								
BTMEVAC607	Robotics And Automation	VAC	30	70	100	2	-	-	2
PRACTICALS/ VIVA VOCE		Type	Internal Marks	External Marks	Total	L	T	P	Credits
BTMEPCC608	Metrology Lab	LC	60	40	100	-	-	1	1
BTMEPCC609	Vibration Lab	LC	60	40	100	-	-	1	1
BTMEPCC610	Machine Design Practice II Lab	LC	60	40	100	-	-	1	1
BTMEPCC611	Thermal Engineering Lab	LC	60	40	100	-	-	1	1
BTMEPROJ612	Engineering Project-I (Literature Review)	PROJ	60	40	100	-	-	2	2
BTMEHSMC 613	Social Outreach, Discipline & Extra Curricular Activates	HSMC	100	-	100	-	-	-	1
TOTAL			610	690	1300	20	0	6	27

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BTMEHSMC606.B: Finance & Accounting

Objectives:

- To know the various sources of finance
- To familiarize oneself with the techniques used in financial management.

Course Contents:

Unit-I **Financial Management** – Financial goals - Profit vs. Wealth Maximization; Finance Functions – Investment, Financing and Dividend Decisions – Cost of Capital – Significance of Cost of Capital – Calculation of Cost of Debt – Cost of Preference Capital – Cost of Equity Capital (CAPM Model and Gordon's Model) and Cost of Retained Earnings – Combined Cost of Capital (weighted/Overall).

Unit-II **Capital Budgeting** – Nature of Investment Decisions – Investment Evaluation criteria – Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), Payback Period, Accounting Rate of Return (ARR) – NPV and IRR comparison.

Unit-III **Operating and Financial Leverage** – Measurement of Leverages – Effects of Operating and Financial Leverage on Profit – Analyzing Alternate Financial Plans - Combined Financial and Operating Leverage – Capital Structure Theories - Traditional approach - M.M. Hypotheses – without Taxes and with Taxes – Net Income Approach (NI) – Net Operating Income Approach (NOI) - Determining capital structure in practice.

Unit- IV **Dividend Policies** – Issues in Dividend Decisions – Relevance Theory – Walter's Model – Gordon's Model – Irrelevance Theory – M-M hypothesis - Dividend Policy in Practice – Forms of Dividends – Stability in Dividend Policy – Corporate Dividend Behaviour.

Unit-V **Management of Working Capital** – Significance and types of Working Capital – Calculating Operating Cycle Period and Estimation of Working Capital Requirements – Financing of Working Capital and norms of Bank Finance – Sources of Working capital – Factoring services– Various committee reports on Bank Finance – Dimensions of Working Capital Management.

REFERENCES

1. Khan MY, Jain PK, BASIC FINANCIAL MANAGEMENT, Tata McGraw Hill, Delhi , 2005.
2. Chandra, Prasanna, FINANCIAL MANAGEMENT, Tata McGraw Hill, Delhi.
3. Bhalatosh Banerjee, FUNDAMENTALS OF FINANCIAL MANAGEMENT, PHI, Delhi, 2010
4. Chandra Bose D, FUNDAMENTALS OF FINANCIAL MANAGEMENT, PHI, Delhi, 2010
5. Preeti Singh, FUNDAMENTALS OF FINANCIAL MANAGEMENT, Ane, 2011.

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Course Outcomes:

Upon completion of this course, students will able to:

CO1: Exemplify to prepare and analyze the financial statements.

CO2: Acquire the basic concept of accounting terms.

CO3: Journalize the ability to rectify the errors in bank reconciliation statement.

CO4: Exposed to various methods of depreciation and insurance accounting.

CO5: Demonstrate insight into single and double entry system of accounting.

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
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CO2	L2	M	M	M	M	L	-	-	-	-	M	-	L	M	M
CO3	L2	M	M	M	M	L	-	-	-	-	M	-	L	M	M
CO4	L2	M	M	M	M	M	-	-	-	-	M	-	L	H	M
CO5	L2	M	M	M	M	L	-	-	-	-	M	-	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO1,CO2, CO3, CO4, CO5
CD3	Seminars	CO3, CO4
CD4	Self- learning advice using internets	CO2, CO3, CO4, CO5
CD5	Industrial visit	CO3, CO4, CO5

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MINUTES OF THE BOARD OF STUDIES,

FACULTY OF ENGINEERING & TECHNOLOGY

DATE : **10th February 2024**

TIME : **02:30 PM**

VENUE : **UNIVERSITY CONFERENCE ROOM SITAPURA CAMPUS, JAIPUR**

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Faculty of Engineering and Technology
Board of Studies Meeting

Date:08.02.2024

Notice

The 32nd meeting of Board of Studies will be held on 10.02.2024 at 2.00pm in the Conference Room (E-001), E-Block, Sitapura Campus, Jagannath University, Jaipur. All the members are requested to kindly attend the same:

The agenda of the meeting is as follows:

32.1 To confirm the minutes of the previous meeting of the Board of Studies held on 17th Aug. 2023.
32.2 To review the Action Taken Report of the Minutes of the Meeting of the Board of Studies held on 17th Aug. 2023.
32.3 To consider and approve the New Courses added in the syllabi.
32.4 To consider and approve the revision in the course content.
32.5 To review the implementation of integration of research component in UG programs.
32.6 To consider and approve the Value Added courses in upcoming semester.
32.7 To consider and approve the syllabi of B Tech and Diploma (CSE/EE/ME/CE), BCA, MCA programs for Even Semester 2023-24.
32.8 To review the status of Enrollment in MOOCs.
32.9 To consider and approve the departmental Academic Calendar.
32.10 To discuss the outcome/ status of previous semester Slow and Advance Learner in all the programs.
32.11 To review the progress of Mentor Mentee program.
32.12 To consider and approve the new programs to be introduced in the Academic Session 2024-25.
32.13 To review the status and future plan of collaboration with industry for internships / trainings / projects.
32.14 To apprise activities organized by Faculty of Engineering and Technology during the last odd semester.
32.15 To note the participation of teachers in conferences/seminars and publication of Research papers in UGC Care listed Journals.
32.16 To discuss the Training & Placement activities plan for internships and placement lined up in the department.
32.17 Any other item with the permission of the chair.

08/02/2024

Prof. (Dr.) Om Prakash Sharma)
Dean Faculty of Engineering and Technology

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INDEX OF THE MINUTES OF

THE BOARD OF STUDIES, FACULTY OF ENGINEERING & TECHNOLOGY, JAGAN NATH UNIVERSITY, JAIPUR

HELD ON 10TH FEBRUARY 2024 AT 02:30 PM

10.02.2024

Prof. (Dr.) Om Prakash Sharma)
Dean Faculty of Engineering and Technology

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MINUTES OF THE BOARD OF STUDIES,

FACULTY OF ENGINEERING & TECHNOLOGY

DATE	:	**10th February 2024**
TIME	:	**02:30 PM**
VENUE	:	**UNIVERSITY CONFERENCE ROOM SITAPURA CAMPUS, JAIPUR**

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MINUTES OF THE

BOARD OF STUDIES, DEPARTMENT OF ENGINEERING & TECHNOLOGY

JAGAN NATH UNIVERSITY, JAIPUR

The 32nd meeting of the Board of Studies of Faculty of Engineering & Technology, Jagan Nath University, Jaipur, was held on 10TH February 2024 at 02:30 pm in the University Conference Room, Jagan Nath University, Sitapura Campus.

The following members attended the meeting:

1). Prof. (Dr.) Om Prakash Sharma (Dean FoET)	: Convener
2). Prof. (Dr.) Vivek Kr. Sharma, Professor	: Members
3). Prof. (Dr.) Ramesh Bharti, Professor EE	: Member
4). Prof. (Dr.) Renu Bagoria, Professor CSE	: Member
5). Dr. Amit Kumar Saraf, Associate Professor ME	: Member
6). Mr. Hemant Kr. Agarwal, Assistant Professor CE	: Member
7). Dr. Hukum Saini Associate Professor Comp. App.	: Member
8). Prof. (Dr.) Ritu Vijay, Professor Dean Banasthali Vidhyapith (EE/ECE)	: Expert from Academia
9). Dr. Madhavi Sinha, Associate Professor, BIT Mesra, Jaipur (CSE/CA)	: Expert from Academia
10). Prof. (Dr.) Mayank Varshney, Ex Principal, VIT, Jaipur (Civil/ME)	: Expert from Academia
11). Mr. Sankalp Gupta, Director Technos Inst. and Center of Excellence	: Expert from Industry
12). Ms. Deepika Agarwal Project Leader, Sopra Banking Softwares, Noida	:Alumni Representative
13). Ms. Ritika Middha, Project consultant, Online System	: Alumni Representative
14). Dr. Mayank Mathur, Dy. Registrar	: Special Invitee
15). Mr. Avinash Nath Tiwari, TIC ME	: Special Invitee
16. Dr. Anil Sharma, Dean Academics	: Special Invitee
17. Ms. S. N Sana, Head Training and Placement	: Special Invitee

Due to unavoidable reasons Dr. Vaishali Sharma, Dean FoMS, could not attend the meeting.

At the outset, Prof. (Dr.) Om Prakash Sharma (Dean FoET), the Convener, Board of Studies welcomed and thanked all the members & experts of the new BoS committee formed as per the Office Order Ref. No.:JU/Regr./2023-24/7496 dated 8th Feb 2024, for sparing their valuable time for attending the meeting of the Board of Study of the Faculty of Engineering & Technology.

On behalf of the Management and FoET Prof. (Dr.) Om Prakash Sharma conveyed special gratitude to all

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After brief self introduction of all the members, expects and special invitee, the following items on agenda were taken up for consideration:

Item No. 32.1: To confirm the minutes of the previous meeting of the Board of Studies held on 17th Aug. 2023.

Resolution: The Minutes of the 31st Meeting of the Board of Studies were circulated amongst the members. No observations have been received. The Minutes of the Meeting of the BOS held on 17th August 2023 were confirmed. **(Annexure 32.1)**

Item No. 32.2: To review the Action Taken Report of the Minutes of the Meeting of the Board of Studies held on 17th August 2023.

Resolution: Keeping in the view the suggestions received from members of Board of Studies. The board apprised Action Taken by the Department. Action taken report is attached here with this report. **(Annexure 32.2)**

Item No. 32.3: To consider and approve the New Courses added in the syllabi.

Item No. 32.4: To consider and approve the revision in the course content.

Resolution: Academic Experts and Members as per the following Group A/B/C jointly observed the scheme and the syllabus

Group A (B Tech CSE, BCA, MCA and Diploma): Dr. Madhavi Sinha, Associate Professor, BIT Mesra, Jaipur, Dr. Renu Bagoria, Professor CSE and Dr. Hukum Saini, Associate Professor

Group B (B Tech EE/ECE and Diploma): Dr. Ritu Vijay, Professor & Dean Banasthali Vidhyapith, Dr. Om Prakash Sharma Professor ECE/EE and Dr. Ramesh Bharti, Professor ECE/EE

Group C (B Tech ME/CE and Diploma ME/CS): Prof. (Dr.) Mayank Varshney, Ex Principal, VIT, Jaipur Dr. Amit Kumar Saraf, Associate Professor ME Mr. Hemant Kr. Agarwal, Assistant Professor CE. Valuable suggestions and inputs are as follows;

(i) The BOS considered and approved the changes in scheme of the Engineering Physics & Engineering Chemistry courses in B. Tech I & II Semester (Batch 2023-27 & onwards). Half of the Students of the Intake will study Engineering Physics and rest half of the students will study Engineering Chemistry courses.

(ii) Keeping in view of the AICTE's model curriculum, the BOS considered and approved the changes in scheme & syllabi of Engineering Mathematics Courses in B.Tech. I, II, III & IV Semester (Batch:2022-26, 2023-27 & onwards).

(iii) The BOS considered and approved the changes in scheme & syllabi in MCA I- Semester (Batch 2023-25 & onwards).

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(iv) The BOS considered and approved the changes in scheme in BCA I & II Semester (Batch 2023-26 & onwards).

(v) The BOS considered and approved the changes in scheme & syllabi of B.Tech III – Semester Computer Science Engineering specialization – Data Science, AI & ML (Batch 2022-26)

(vi) The BOS considered and approved the changes in scheme & syllabi of B.Tech III-Semester Civil, Mechanical, Agriculture (Batch 2022-26).

(vii) Suggestions in B Tech/M Tech/ Diploma ME_CE (Dr Mayank Varshney): Credit should be more in projects, Seminar should be included in IV semester, Number of lectures should be decreased from 2 hrs to 1 hrs of audit courses, Number of lectures for Research Methodology should be decreased from 3hrs to 2hrs., Software courses should be added in final year of both B Tech ME & CE such as MINITAB, Solid Works, CATIA etc.

(viii) Suggestions in B Tech/M Tech/ Diploma/MCA/BCA (Dr. Madhavi Sinha): Emphasized internship placement in the second semester for BCA students, in accordance with NEP guidelines, Propose scheduling DSA (Data Structures and Algorithms) immediately after programming subjects in the second semester, VAC (Value Added Courses) to include Yoga/Sports excluding theoretical subjects, Restructuring BCA code 805 to focus on Project & Thesis writing with a distinctive dissertation component, Suggest integrating advanced subjects like **AI/ML/Networking** into the final year semester of Honour BCA, Practical subjects to be given higher credit weight age compared to theory subjects, Reduction of hours allocated to non-technical subjects, Recommend establishing prerequisite subjects (BTECH 703A,B,C) for BTECH streams (606A,B,C) to enhance continuity and coherence in learning, Propose offering SPM (Software Project Management) as a reading elective or MOOC course in the fourth semester of MCA, Bridge courses in MCA to be treated as Non Passing or non-creditable and separate mark sheets to be provided,

(ix) Suggestions in B Tech/M Tech/ Diploma EE (Dr. RITU VIJAY): Seminar and Project Components should be Completed by the end of VI Semester in place of VII and VIII semester, Expert Suggested more Language courses as per Open Elective Components, Syllabus Should Includes some reading Elective Subjects in VII and VIII Semester.

Item No. 32.5: To review the implementation of integration of research component in UG programs.

Resolution: The BOS considered the status of the implementation of integration of research component in UG programs. **(Annexure: 32.5)**

Item No. 32.6: To consider and approve the Value Added courses in upcoming semester.

Resolution: The BOS considered and approved the Couple of Value Added courses/Add on Courses to be offered for upcoming Semester in the academic session 2023-24 **(Annexure: 32.6)**

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Item No. 32.7: To consider and approve the syllabi of B Tech and Diploma (CSE/EE/ME/CE), BCA, MCA programs for Even Semester 2023-24.

Item No. 32.8: To review the status of Enrollment in MOOCs

Resolution: All the members of the BOS appreciated the large numbers of students registered for the MOOC courses. Convener informed the house that management is ready to reimburse the Examination fees of Faculty and Students if they submit the documents/Proof of passing in the MOOC course. **(Annexure 32.8).**

Item No. 32.9: To consider and approve the departmental Academic Calendar.

Resolution: The BOS considered and approved the departmental Academic Calendar for upcoming odd semester in the academic session 2023-24 **(Annexure 32.9).**

Item No. 32.10: To discuss the outcome/ status of previous semester Slow and Advance Learner in all the programs.

Resolution: The BOS considered the outcome/ status of previous semester Slow and Advance Learner of the department and resolved to work on the slow learners rigorously **(Annexure 32.10).**

Item No. 32.11: To review the progress of Mentor Mentee program.

Resolution: The BOS considered and reviewed progress of Mentor-Mentee program of the department and resolved to implement the Mentor-Mentee program more religiously and rigorously.

Item No. 32.12: To consider and approve the new programs to be introduced in the Academic Session 2024-25.

Resolution: The members present appreciated the syllabus and scheme of Data Science. The members suggested to start B Tech Electronics and Communication in near future if possible.

Item No. 32.13: To review the status and future plan of collaboration with industry for internships / trainings / projects.

Resolution: The members present appreciated the MOUs of Ultra Tech, Veteran India Limited and Bajaj Engineering Skills Training (BEST) Center Banasthali Vidhapith. The BOS recommends to form a Departmental committee that will work for collaboration with industry for industry interaction and trainings along with the Training & Placement Cell of the University.

Item No. 32.14: To apprise activities organized by Faculty of Engineering and Technology during the last odd semester.

Resolution: The BOS reviewed and apprised activities conducted by the Department as per Academic Calendar and resolved to conduct more activities for the development of students and faculty members. **(Annexure 32.14)**

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Item No. 32.15: To note the participation of teachers in conferences/seminars and publication of Research papers in UGC Care listed Journals.

Resolution: The BOS reviewed the activities/participation of teachers in conferences/seminars and their research publications and resolved to encourage more quality research publications through incentive schemes of the university. **(Annexure 32.15)**

Item No. 32.16: To discuss the Training & Placement activities plan for internships and placement lined up in the department.

Resolution: The BOS reviewed the Training & Placement activities plan for internships and placement lined up in the department **(Annexure 32.16)**

Item No. 32.17: Any other item with the permission of the chair.

Resolution: No issue was raised.

The meeting ended with vote of thanks to the Chair.

10.02.2024

Prof. (Dr.) Om Prakash Sharma
Dean, Faculty of Engineering & Technology.

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JU/2023-24/FOL/15 Date: 21.8.23

Faculty of Law

Notice cum Agenda for conducting meeting of Board of Studies

A meeting of the Board of Studies is scheduled to be held on 23 August 2023 at 10:30 A.M. in the conference hall. All the members are requested to kindly attend the meeting.

The agenda of the meeting is as follows:

19. To confirm the minutes of the previous meeting of the Board of Studies held on 22nd February, 2023

2. To approval of two new branches of LL.M. program i.e. **Intellectual Property Law** and **Cyber Law**

3. Review and Rectification of all CO's of all subjects of whole syllabus of BALLB and BBALLB session 23-24

4. To consider and approve division of all courses of whole syllabus in V Units in place of IV Units for session 23-24

5. To consider and approve change in syllabus of Law of Crime-I BA/BBALLB 303

6. To consider and approve change in syllabus of Law of Crime-II BA/BBALLB 403

7. To consider and approve change in syllabus of Law of Evidence BA/BBALLB 502

8. To consider and approve change in syllabus of Company Law BA/BBALLB 503

9. To consider and approve change in syllabus of Jurisprudence BA/BBALLB 601

10. To consider and approve change in syllabus of International Law BA/BBALLB 602

11. To consider and approve change in syllabus of Transfer of Property Act 1882 BA/BBALLB 603

12. To consider and approve change in syllabus of Cyber Law BA/ BBALLB 703

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13. To consider and approve change in syllabus of Interpretation of Statutes BA/ BBALLB 803

14. To consider and approve change in syllabus of Legal Ethics and Court Crafts BA/BBALLB 901

15. To consider and approve change in syllabus of Land and Real Estate Laws BA/BBALLB 903

16. To delete Criminology BA/BBALLB 705 D from VII Semester

17. To Consider shifting of International Humanitarian Law BA/BBALLB 805C From VIII semester to VII semester as International Humanitarian Law BA/BBALLB 705 D

18. To introduce new course Criminology, Penology & Victimology BA/BBALLB 805C in VIII semester in BA/BBALLB

19. Any Other Item with the permission of Chair.

S/d
Prof. (Dr.) S.P.S. Shekhawat
Convener, Board of Studies
Dean, Faculty of Law

Copy Forward to Information and Necessary action: -

1. Vice Chancellor
2. Registrar
3. Dr Anil Sharma
4. Prof. K.L.Sharma
5. Dr. Saughat Roy
6. Dr. Shilpi Khandelwal
7. Dr. Suman Paliwal
8. Ms. Alaknanda Rajawat
9. Mr. Pradeep Rajpurohit

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Semester-VIII

Code No.	Paper	Type	Evaluation		Max. Marks	Lecture (Theory Paper)	Credits
			Internal Max Marks	End Term Max Marks			
BALLB 801	Intellectual Property Rights	Core	30	70	100	4	4
BALLB 802	Labour Law-II	Core	30	70	100	4	4
BALLB 803	Interpretation of Statutes	Core	30	70	100	4	4
BALLB 804	International Trade Law	Core	30	70	100	4	4
BALLB 805	**Seminal Paper-II****	Elective	30	70	100	4	4
BALLB 806	Comprehensive Viva	Core	100	-	100	-	2
BALLB 807	ANANDAM	AECC	50	50	100	1+1	2
	Personality Development Programme (PDP) (Non-Credit)		-	-	-	-	-
	Moot Court*/Tutorial/Practical Training/ Seminars (Non-Credit)		-	-	-		
	Summer Training**(Non-Credit)		-	-	-	-	-
	Total		300	400	700	22	24

*It is compulsory to attend and participate in the Moot Court Competitions and Court Visits and submit their certificate of participation accordingly. The marks of Moot Court and Court Visit will be awarded in 10th Semester.

** At the end of 2nd year of the program, Students shall undergo summer training (during summer vacations) either with a corporate or a Law Firm. They will have to submit a Report of the same and the marks will be awarded in 10th Semester.

****Seminal Papers**

These papers are to cover upcoming and specialized subjects of law which will offer a choice to the students to develop expertise in the areas of their interest/choice. The following papers will be offered as Seminal papers as may be decided by the Dean/HoD:

805 A. International Commercial Law

805 B. Election Law

805 C. Crimonology, Penology & Victimology

805 D. Indirect Taxes

BALLB 805 C:

Criminology, Penology & Victimology

Course Objective:

- To acquaint the students with the basic concepts about criminology,penology and Victimology
- To provide a deep understanding of the nature and ideological thinking of criminological studies.
- To provide knowledge about rights of victims

Syllabus

Unit-I: Introduction of Criminology

a. Definition, Nature, scope and Importance of Criminology

b. Relation with other Social Sciences

Unit-II: Factor responsible for causation of Crime

a. Environment, home and Community Influences.

b. War & Communal Riots

c. Other factors

Unit-III: Theories of Punishments

a. Deterrent theory

b. Retributive theory
c. Preventive theory
d. Expiatory theory
e. Reformative theory

Unit-IV: Police System & Prison System

a. Role and Functions of Police
b. National Police Commission (recommendations)
c. Prisons in India: Organisation, Type and Functions
d. Prisons Problems and Reforms
e. Rights of Prisoners

Unit-V: Victimology

a. Meaning , Nature and Scope of Victimology
b. Victim's role in Administration of Criminal Justice
c. Legal and Human Rights of Victims
d. Compensation to victims of Crime

PSDA (Professional Skill Development Activities)

Text Books:

1. N.V. Pranjape, Criminology, Penology and Victimology (Central Law Publication, Allabad, 2017)
2. S.R. Myneni, Crime and Criminology (Allabad Law Agenccy, Faridabad 2017)

References:

1. Frank A. Hagan, *Introduction to Criminology: Theories, Methods and Criminal Behavior*; 1978, Sage Publications Ltd., London
2. Larry Seigel, *Criminology*, 2008, Thomson Wadsworth, Canada
3. Sue Titus Reid, *Crime and Criminology*; 2008; Oxford University Press, Oxford
4. Mark Tunic, *Punishment: Theory and Practice;* 1992 University of California Press, Berkeley
5. Robert Elias, *Victims Still: Political Manipulation of Crime Victim, 1993, Sage Publications Inc.*
6. R. I. Mawby & S. Walkate, *Critical Victimology*; 1995, Sage Publications Ltd London

Course Outcomes:

Students who have taken admission for this course will be able to:

CO1: Students are able to recognise the basic concepts about criminology,penology and victimology (L3)

CO2: The students are able to understand nature and ideological thinking of criminological studies. (L1)

CO3: Evaluate the reasons behind the crime and significance of Penology in the present society (L2)

CO4. The difference between crime and morality as the concept of crime changes from society to society. (L3)

CO5. Theories of the punishments and its application in the criminal justice system. (L1)

Course Delivery methods	
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self- learning advice using internets
CD5	Court visit
CD6	PDP

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO01	PSO02
CO1	L3	H	H	H	H	M	H	M	L	L	L	H	M
CO2	L1	M	L	M	M	M	M	M	M	M	H	M	M
CO3	L2	L	L	-	M	L	H	H	M	M	M	M	L
CO4	L3	H	H	M	L	H	M	L	H	H	L	H	M
CO5	L1	M	L	L	H	L	L	M	L	L	M	M	M

HL- High, M- Moderate, L- Low, '-' for No correlation

Mapping between CO and CD

CD	Course Delivery methods	Course Outcomes
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4
CD2	Tutorials/Assignments	CO2, CO3, CO5
CD3	Seminars	CO3
CD4	Self- learning advice using internets	CO1, CO3
CD5	Court visit	CO2, CO3
CD6	PDP	CO1

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