Board of Studies
File
For the Academic Year 2025-26

COMPUTER SCIENCE AND ENGINEERING

For

B. Tech FOUR YEARS DEGREE PROGRAM
(Applicable for batches admitted from 2024-2025)

&

M. Tech TWO YEARS DEGREE PROGRAM
(Applicable for batches admitted from 2024-2025)

D. N. R. COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada)

(Accredited with A^{++} Grade by NAAC & Accredited by NBA (B. Tech- CSE, ECE & EEE))

BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

Ph: 08816-221238, Email: *dnrcet@gmail.com* **,** ***Website:*** *https://dnrcet.org*

Phone: 08816-221237

D. N. R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)
(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada)
(Accredited with A++ Grade by NAAC)
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DR. G. SATYANARAYANA
MCA, M. Tech (CSE), PhD, MISTE, MIAENG, MIACSI, MSDIWC, MCSTA, MIFREP, MIRED, MCSI
HoD, CSE

BHIMAVARAM
W. G. DIST (AP)
PIN: 534202

CIRCULAR

Ref: *DNRCET/CSE/2024-25/BoS/C-2* **Date:** *20.03.2025*

It is to inform all BoS members of the CSE department to attend the BoS meeting to be conducted ***on 24th March, 2025*** at ***10:00 am.*** The following agenda is being discussed.

Agenda:

1. Introducing the members of Board of Studies.
2. Discussion on II year Semester I & II course structure for B. Tech (Computer Science & Engineering) and II Year Semester I & II for M. Tech (Computer Science & Engineering) Programs for the academic year 2025 – 26.
3. Discussion on preparation of course syllabus in accordance to JNTUK course structure and syllabus.
4. Discussion on Academic Regulations of both UG & PG Programs.
5. Discussion on preparation of II Year Semester I & II course structure and course syllabus offered to other departments in accordance to JNTUK course structure and syllabus for the academic year 2025 – 26.
6. Discussion and finalizing the model papers for the academic year 2025 – 26.
7. To discuss the Certificate Courses to be done by the students & staff.
8. To discuss the functional MoUs with the industries.
9. To discuss the feasibility of developing collaborations with other institutions.
10. To evolve a plan of action for consultancy activities.
11. Any other agenda with the permission of the chair.

20/3/2025

Chairperson Board of Studies /
Head of the Department
Department of Computer Science & Engineering

Head of the Department
Department of Computer Science & Engineering
D.N.R. College of Engineering & Technology
BHIMAVARAM-534 202.

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Department of Computer Science & Engineering

Date: 20.03.2025

To
Dr. N. Ramakrishnaiah,
Professor,
CSE Department,
UCEK, JNTUK Kakinada,
Kakinada – 533003.

Dear Sir,

Sub: DNR College of Engineering & Technology – Department of Computer Science & Engineering – Board of Studies Meeting – Reg.

We take the privilege in inviting you for the Board of Studies Meeting of Department of Computer Science & Engineering, DNR College of Engineering & Technology as an Expert Nominated by Vice-Chancellor, JNTUK, Kakinada. It is proposed to discuss and finalize the course structure and syllabi for the 2nd year of DR24 B. Tech (CSE) course curriculum and the 2nd year of DR24 M. Tech(CSE) course curriculum.

In this regard, you are requested to attend the meeting scheduled to be held on **24.03.2025** at **10.00 am** in online mode.

Kindly accept our invitation and make it convenient to attend the Board of Studies meeting.

Thanking You Sir

Yours Sincerely,

20/3/2025

Chairperson Board of Studies /
Head of the Department

Head of the Department
Department of Computer Science & Engineering
D.N.R. College of Engineering & Technology
BHIMAVARAM-534 202.

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Department of Computer Science & Engineering

Date: 20.03.2025

To

Dr. V. Chandrasekhar,
Professor & Dean,
Department of Computer Science & Engineering,
S. R. K. R. Engineering College (A),
BHIMAVARAM 534202.

Dear Sir,

Sub: DNR College of Engineering & Technology – Department of Computer Science & Engineering – Board of Studies Meeting – Reg.

We take the privilege in inviting you for the Board of Studies Meeting of Department of Computer Science & Engineering, DNR College of Engineering & Technology as an Expert Nominated by Vice-Chancellor, JNTUK, Kakinada. It is proposed to discuss and finalize the course structure and syllabi for the 2nd year of DR24 B. Tech (CSE) course curriculum and the 2nd year of DR24 M. Tech(CSE) course curriculum.

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20/3/2025

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Head of the Department

Head of the Department
Department of Computer Science & Engineering
D.N.R. College of Engineering & Technology
BHIMAVARAM-534 202.

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Department of Computer Science & Engineering

Date: 20.03.2025

To
Dr. P. Kiran Sree,
Professor & HoD,
Department of Computer Science & Engineering,
Shri Vishnu Engineering College for Women (A),
Bhimavaram, W.G. Dist., A.P.

Dear Sir,

Sub: DNR College of Engineering & Technology – Department of Computer Science & Engineering – Board of Studies Meeting – Reg.

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Head of the Department

Head of the Department
Department of Computer Science & Engineering
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Department of Computer Science & Engineering

Date: 20.03.2025

To

Rajiv Chand Kakarla
CEO, Amaravathi Software Innovations
Rajahmundry,
East Godavari District, A.P.,

Dear Sir,

Sub: DNR College of Engineering & Technology – Department of Computer Science & Engineering – Board of Studies Meeting – Reg.

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Thanking You Sir

Yours Sincerely,

20/3/2025

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Head of the Department
Department of Computer Science & Engineering
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Dr. G. SATYANARAYANA
MCA, M. Tech (CSE), PhD, MISTE, MIAENG, MIACSI, MSDIWC, MCSTA, MIFREP, MIRED, MCSI
Professor & HoD, CSE

Department of Computer Science & Engineering
E-Mail: sreesatyam@dnrcet.org
Mobile: +91-9491922706, Phone: 08816-221237

CIRCULAR

Ref: *DNRCET/CSE/2024-25/BoS/C-2* **Date:** *20.03.2025*

It is to inform all BoS members of the CSE department to attend the BoS meeting to be conducted ***on 24th March, 2025*** at ***10:00 am.*** The following agenda is being discussed.

Agenda:

1. Introducing the members of Board of Studies.
2. Discussion on II year Semester I & II course structure for B. Tech (Computer Science & Engineering) and II Year Semester I & II for M. Tech (Computer Science & Engineering) Programs for the academic year 2025 – 26.
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9. To discuss the feasibility of developing collaborations with other institutions.
10. To evolve a plan of action for consultancy activities.
11. Any other agenda with the permission of the chair.

20/3/2025

Chairperson Board of Studies /
Head of the Department

Head of the Department
Department of Computer Science & Engineering
D.N.R. College of Engineering & Technology
BHIMAVARAM-534 202.

Copy to

1. The Members of BoS,
2. The Principal, DNRCET(A),
3. The Dean, Academics, DNRCET(A),
4. Office file.

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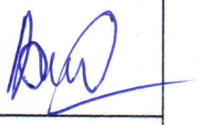
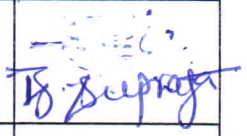
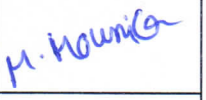
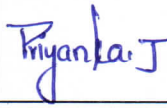
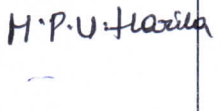
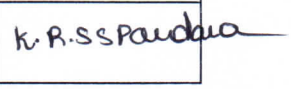
Dr. G. SATYANARAYANA
MCA, M. Tech (CSE), PhD, MISTE, MIAENG, MIACSI, MSDIWC, MCSTA, MIFREP, MIRED, MCSI
Professor & HoD, CSE

Department of Computer Science & Engineering
E-Mail: sreesatyam@dnrcet.org
Mobile: +91-9491922706, Phone: 08816-221237

List of members of Board of Studies

S. No.	Category	Name	Position	Signature
1	Chairperson	Dr. G. Satyanarayana	Professor & HoD Department of CSE DNRCET, Bhimavaram	
2	Expert Nominated by Vice-Chancellor	Dr. N. Ramakrishnaiah	Professor, CSE Department, UCEK, JNTUK Kakinada, Kakinada – 533003.	
3	Subject Experts from outside Parent Universities	Dr. V. Chandrasekhar,	Professor & HoD, Department of CSE, S. R. K. R. Engineering College (A), BHIMAVARAM 534202.	
4		Dr. P. Kiran Sree,	Professor & HoD, Department of CSE, Shri Vishnu Engineering College for Women (A), Bhimavaram, W.G. Dist., A.P.	
5	Member (Industrial Expert)	Rajiv Chand Kakarla	CEO, Amaravathi Software Innovations, Rajahmundry, East Godavari District, A.P.,	E-Mail.
6	Members Secretary	Mr. K. T. V. Subba Rao	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
7	Faculty Members	Mr. K. S. R. Prasad	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	

		Mr. B. Nandan Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. L. Bujji Babu	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. K. S. H. Prasanna Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. N. Bharathi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. L. Dhanaratna Kishore	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. B. Supraja	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. G. V. Sriram	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. M. Mounica Devi B.Durga	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. P. Lalitha Rajeswari Supraja	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. J. Priyanka	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Ms. K. Siva Syamala	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. M. V. S. K. Prabhavathi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. Ch. Venkat Reddy	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. M. P. V. Harika	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. K. R. S. Spandana	Assistant Professor, Department of CSE,	

			DNRCET, Bhimavaram.	
		Mrs. M. Bhargavi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. B. Suryanarayana Murthy	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. K. Rambabu	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. P. Sirish Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. G. Rajendra Kumar Bhanu	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. B. Prasanna Kumar Priyanka	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. K. Radha Krishna Bhargavi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. G. Sai Krishna Suparaja	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. Areti Mohan Manidranadh Ram Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. I. Ramadevi Thanuri	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Ms. D. Phani Sri Lakshmi Venkat Reddy	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. T. Venkatesh Ram Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. Ch. Somesh Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
8	Member (College alumni)	K. S. Sai Kumar (219P1D5804) Bhargavi	Assistant Professor, Department of CE, VIT, Bhimavaram.	

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Ref: *DNRCET/CSE/2024-25/BoS/MoM-2* **Date:** *24.03.2025*

Board of Studies (BoS) Minutes of Meeting

24th MARCH, 2025 at 10:00 am.

Agenda:

1. Introducing the members of Board of Studies.
2. Discussion on II year Semester I & II course structure for B. Tech (Computer Science & Engineering) and II Year Semester I & II for M. Tech (Computer Science & Engineering) Programs for the academic year 2025 – 26.
3. Discussion on preparation of course syllabus in accordance to JNTUK course structure and syllabus.
4. Discussion on Academic Regulations of both UG & PG Programs.
5. Discussion on preparation of II Year Semester I & II course structure and course syllabus offered to other departments in accordance to JNTUK course structure and syllabus for the academic year 2025 – 26.
6. Discussion and finalizing the model papers for the academic year 2025 – 26.
7. To discuss the Certificate Courses to be done by the students & staff.
8. To discuss the functional MoUs with the industries.
9. To discuss the feasibility of developing collaborations with other institutions.
10. To evolve a plan of action for consultancy activities.
11. Any other agenda with the permission of the chair.

The Board of Studies meeting held on 24th March, 2025 at 10:00 am through online & offline mode with the welcome speech by Dr. G. SATYANARAYANA, Professor & Head of department / Chairperson of BoS.

The points mentioned in the agenda were discussed, and the details are listed below:

Agenda No. 1: The Board of Studies (BoS) for Computer Science and Engineering department is constituted by the chairperson as per the guidelines of Academic Council. The Chairperson introduced all nominated Board of Studies members of department of Computer Science & Engineering to each other.

Agenda No. 2, 3, 4: The BoS members discussed on the agenda 2, 3, 4 and made the following resolutions.

Resolution on Agenda 2, 3, 4:

The members of the Board of Studies (BoS) and the chairperson made the decision to follow the JNTUK, Kakinada R-23 regulations for B. Tech Program and R-19 regulations for M. Tech Program that were put into place for second year students for the academic year 2025-2026. This included adhering the academic regulations, syllabi, model papers, and the evaluation procedure for semester-end examinations (SEE) and continuous internal evaluation (CIE).

Agenda No. 5: The BoS members discussed on the agenda 5 and made the following resolutions.

Resolution on Agenda 5:

The members of the Board of Studies (BoS) and the chairperson made discussion on preparation of computer science and engineering core courses, its course structure and course syllabus offered to other departments in accordance to JNTUK syllabus. It is decided to follow the JNTUK, Kakinada R-23 regulations for B. Tech Program without any modifications that were put into place for second year students for the academic year 2025-2026. This included adhering the academic regulations, syllabi, model papers, and the evaluation procedure for semester-end examinations (SEE) and continuous internal evaluation (CIE).

Agenda No.6: The BoS members discussed on the agenda 5 and made the following resolutions.

Resolution on Agenda 6:

As it is decided to adhere JNTUK, Kakinada R-23 model paper without any change in agenda 5. The chairperson of the BoS discussed and finalized with the model paper with two sections. Section- A consists of 10 small questions, each carry 2 marks and it should be 2 from each unit. The Section-B consists of five question with internal choice which carry 10 marks each and it should be each from one unit of the syllabus. All the members accepted unanimously and list is finalized and enclosed in Annexure G.

Agenda No.7: The BoS members discussed on the agenda 6 and made the following resolutions.

Resolution on Agenda 7:

To bridge the gap to academics and industry for 2nd year B.Tech., students from their previous learning method to problem solving method it is unanimously accepted to introduce the certificate courses to the student to improve their programming skills as well as increasing the concept of implementation skills.

Also accepted to introduce the certificate courses for the faculty members to enrich their knowledge levels in latest technological areas. All the members accepted unanimously and list is finalized and enclosed in Annexure H.

Agenda No.8: The BoS members discussed on the agenda 7 and made the following resolutions.

Resolution on Agenda 8:

To strengthen the students' skills conducting Guest Lectures, Workshops, Seminars and other co-curricular activities through MoUs with reputed organizations are required. Hence the BoS members agreed and advised to improve MoUs with reputed organizations/industries.

Agenda No.9: The BoS members discussed on the agenda 8 and made the following resolutions.

Resolution on Agenda 9:

To strengthen the department needs and to develop various skillset of the students it is advised to develop collaborations with the other institution. The BoS members advised to improve the collaboration with reputed institutions towards increasing technical workshops and FDP's and other mode of operations.

Agenda No.10: The BoS members discussed on the agenda 9 and made the following resolutions.

Resolution on Agenda 10:

To BoS members agree and advised to plan consultancy activities for the development of department.

Agenda No.11: As there is no other agenda for discussion; hence the chairperson advised to conclude the meeting with the permission of all the BoS members.

The entire meeting is recorded as video and stored in the department.

The meeting concluded at 11:30 a.m. with a vote of thanks by Dr. G. SATYANARAYANA, Chairperson of BoS / Professor & Head of the department.

N. Rama Krishnaiah

University Nominee

(Dr. N. Rama Krishnaiah)
Professor & Head
Dept. of Computer Science & Engineering
UCEK, JNTUK, Kakinada, AP.

G. Satyanarayana 24.3.2015

Chairperson Board of Studies / Head of the Department

Head of the Department
Department of Computer Science & Engineering
D.N.R. College of Engineering & Technology
BHIMAVARAM-534 202.

Copy to:

1. Principal, DNRCET(A),
2. Dean, Academics, DNRCET(A),
3. Controller of Examinations, DNRCET(A),
4. Circulation among the faculty members, CSE Department, DNRCET(A),
5. File.

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Professor & HoD, CSE

Department of Computer Science & Engineering
E-Mail: sreesatyam@dnrcet.org
Mobile: +91-9491922706, Phone: 08816-221237

List of members of Board of Studies

S. No.	Category	Name	Position	Signature
1	Chairperson	Dr. G. Satyanarayana	Professor & HoD Department of CSE DNRCET, Bhimavaram	
2	Expert Nominated by Vice-Chancellor	Dr. N. Ramakrishnaiah	Professor, CSE Department, UCEK, JNTUK Kakinada, Kakinada – 533003.	
3	Subject Experts from outside Parent Universities	Dr. V. Chandrasekhar,	Professor & HoD, Department of CSE, S. R. K. R. Engineering College (A), BHIMAVARAM 534202.	24/05/25
4		Dr. P. Kiran Sree,	Professor & HoD, Department of CSE, Shri Vishnu Engineering College for Women (A), Bhimavaram, W.G. Dist., A.P.	
5	Member (Industrial Expert)	Rajiv Chand Kakarla	CEO, Amaravathi Software Innovations, Rajahmundry, East Godavari District, A.P.,	Online
6	Members Secretary	Mr. K. T. V. Subba Rao	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
7	Faculty Members	Mr. K. S. R. Prasad	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	

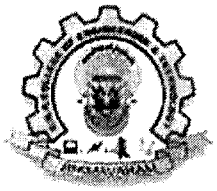
		Mr. B. Nandan Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. L. Bujji Babu	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. K. S. H. Prasanna Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. N. Bharathi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. L. Dhanaratna Kishore	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. B. Supraja	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. G. V. Sriram	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. M. Mounica Devi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. P. Lalitha Rajeswari	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. J. Priyanka	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	24/3/25
		Ms. K. Siva Syamala	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	28/4/25
		Mrs. M. V. S. K. Prabhavathi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. Ch. Venkat Reddy	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. M. P. V. Harika	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. K. R. S. Spandana	Assistant Professor, Department of CSE,	

			DNRCET, Bhimavaram.	
		Mrs. M. Bhargavi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. B. Suryanarayana Murthy	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. K. Rambabu	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. P. Sirish Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. G. Rajendra Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. B. Prasanna Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. K. Radha Krishna	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. G. Sai Krishna	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. Areti Mohan Manidranadh	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mrs. I. Ramadevi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Ms. D. Phani Sri Lakshmi	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. T. Venkatesh	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
		Mr. Ch. Somesh Kumar	Assistant Professor, Department of CSE, DNRCET, Bhimavaram.	
8	Member (College alumni)	K. S. Sai Kumar (219P1D5804)	Assistant Professor, Department of CE, VIT, Bhimavaram.	

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE & SYLLABUS B. Tech CSE for COMPUTER SCIENCE & ENGINEERING PROGRAMME

(Applicable for batches admitted from 2024-2025)



D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

B.Tech. CSE (DR24 Regulation I Year COURSE STRUCTURE & SYLLABUS)

B.Tech. – I Year I Semester (for Group-A Branches)

S. No.	Course Code	Title	Category	L/D	T	P	Credits
1	BT24BS1101	Communicative English	BS&H	2	0	0	2
2	BT24BS1102	Chemistry	BS&H	3	0	0	3
3	BT24BS1103	Linear Algebra & Calculus	BS&H	3	0	0	3
4	BT24CE1101	Basic Civil & Mechanical Engineering	ES	3	0	0	3
5	BT24CS1101	Introduction to Programming	ES	3	0	0	3
6	BT24BS1105	Communicative English Lab	BS&H	0	0	2	1
7	BT24BS1106	Chemistry Lab	BS&H	0	0	2	1
8	BT24ME1103	Engineering Workshop	ES	0	0	3	1.5
9	BT24CS1103	Computer Programming Lab	ES	0	0	3	1.5
10	BT24BS1108	Health and wellness, Yoga and Sports	BS&H	-	-	1	0.5
Total				**14**	**00**	**11**	**19.5**

B. Tech. – I Year II Semester (for Group-A Branches)

S. No.	Course Code	Title	Category	L/D	T	P	Credits
1	BT24BS1205	Engineering Physics	BS&H	3	0	0	3
2	BT24BS1201	Differential Equations & Vector Calculus	BS&H	3	0	0	3
3	BT24EE1201	Basic Electrical and Electronics Engineering	ES	3	0	0	3
4	BT24ME1201	Engineering Graphics	ES	1	0	4	3
5	BT24CS1202	IT Workshop	ES	0	0	2	1
6	BT24CS1201	Data Structures	PC	3	0	0	3
7	BT24BS1209	Engineering Physics Lab	BS&H	0	0	2	1
8	BT24EE1203	Electrical and Electronics Engineering Workshop	ES	0	0	3	1.5
9	BT24CS1203	Data Structures Lab	PC	0	0	3	1.5
10	BT24BH1211	NSS / NCC /Scouts & Guides / Community Service	BS&H	-	-	1	0.5
Total				**13**	**00**	**15**	**20.5**

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B.Tech. CSE (DR24 Regulation II Year COURSE STRUCTURE & SYLLABUS)

B. Tech.–II Year I Semester

S. No.	Course Code	Title	Category	L/D	T	P	Credits
1	BT24BS2105	Discrete Mathematics & Graph Theory	BS&H	3	0	0	3
2	BT24HS2101	Universal human values – understanding harmony and Ethical human conduct	BS&H	2	1	0	3
3	BT24EC2107	Digital Logic & Computer Organization	ES	3	0	0	3
4	BT24CS2101	Advanced Data Structures & Algorithm Analysis	PC	3	0	0	3
5	BT24CS2102	Object Oriented Programming Through Java	PC	3	0	0	3
6	BT24CS2103	Advanced Data Structures and Algorithm Analysis Lab	PC	0	0	3	1.5
7	BT24CS2104	Object Oriented Programming Through Java Lab	PC	0	0	3	1.5
8	BT24CS2105	Python Programming	PC	0	1	2	2
9	BT24BS2106	Environmental Science	MC	2	0	0	-
Total				**16**	**2**	**8**	**20**

B. Tech – II Year II Semester

S. No.	Course Code	Title	Category	L/D	T	P	Credits
1	BT24HS2201	Managerial Economics and Financial Analysis	MG	2	0	0	2
2	BT24BS2202	Probability & Statistics	ES / BS	3	0	0	3
3	BT24CS2201	Operating Systems	PC	3	0	0	3
4	BT24CS2202	Database Management Systems	PC	3	0	0	3
5	BT24CS2203	Software Engineering	PC	2	1	0	3
6	BT24CS2204	Operating Systems Lab	PC	0	0	3	1.5
7	BT24CS2205	Database Management Systems Lab	PC	0	0	3	1.5
8	BT24CS2206	Full Stack Development – I	SEC	0	1	2	2
9	BT24ME2207	Design Thinking & Innovation	BS & H	1	0	2	2
Total				**14**	**2**	**10**	**21**
10		Mandatory Community Service Project Internship of 08 weeks duration during summer vacation					

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year - I Semester	Course Code: BT24BS2105	L	T	P	C
		3	0	0	3

DISCRETE MATHEMATICS AND GRAPH THEORY

Course Objectives:

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications.
- The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

Course Outcomes:

At the end of the course students will be able to

1. Build skills in solving mathematical problems (L3).
2. Comprehend mathematical principles and logic (L4).
3. Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software (L6).
4. Manipulate data numerically sing appropriate Software (L3).
5. Analyze data graphically sing appropriate Software (L4).
6. How to communicate effectively mathematical ideas/results verbally or in writing (L2).

UNIT–I: Mathematical Logic:

Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT-II: Set Theory:

Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams, Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties.

UNIT-III: Combinatorics and Recurrence Relations:

Basis of Counting, Permutations, Permutations with Repetitions, Circular and Restricted Permutations, Combinations, Restricted Combinations, Binomial and Multinomial Coefficients and Theorems.

Recurrence Relations:

Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT-IV: Graph Theory:

Basic Concepts, Graph Theory and its Applications, Subgraphs, Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs,

Unit-V: Multi Graphs

Multigraphs, Bipartite and Planar Graphs, Euler's Theorem, Graph Coloring and Covering, Chromatic Number, Spanning Trees, Prim's and Kruskal's Algorithms, BFS and DFS Spanning Trees.

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L.Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.
3. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, McGraw Hill.

REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L.Mott, A. Kandel and T. P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby and Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year - I Semester	Course Code: BT24HS2101	L	T	P	C
		2	1	0	3

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes:

At the end of the course students will be able to

1. Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2).
2. Identify one's self, and one's surroundings (family, society nature) (L1, L2).
3. Apply what they have learnt to their own self in different day-to-day settings in real life (L3).
4. Relate human values with human relationship and human society (L4).
5. Justify the need for universal human values and harmonious existence (L5).
6. Develop as socially and ecologically responsible engineers (L3, L6).

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I: Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II: Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III: Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV: Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT V: Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values ***Lecture 24:*** Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education PS1 Sharing about Oneself PS2 Exploring Human Consciousness PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being PS4 Exploring the difference of Needs of self and body.

PS5 Exploring Sources of Imagination in the self PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust.

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:

Textbook and Teachers Manual

1. The Textbook

R R Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-47-1

2. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria,*Teachers' Manual for A Foundation Course in Human Values and Professional Ethics,* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. *JeevanVidya: EkParichaya,* A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi
5. *Small is Beautiful* - E. F Schumacher.
6. *Slow is Beautiful* - Cecile Andrews
7. *Economy of Permanence* - J C Kumarappa
8. *Bharat Mein Angreji Raj* – PanditSunderlal
9. *Rediscovering India* - by Dharampal
10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi
11. *India Wins Freedom* - Maulana Abdul Kalam Azad
12. *Vivekananda* - Romain Rolland (English)
13. *Gandhi* - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.
In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self- exploration.
Scenarios may be used to initiate discussion. The student is encouraged to take up" ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.
Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year - I Semester	Course Code: BT24EC2107	L	T	P	C
		3	0	0	3

DIGITAL LOGIC & COMPUTER ORGANIZATION

Course Objectives:

The main objectives of the course is to

- provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals
- Describe memory hierarchy concepts
- Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

Course Outcomes:

At the end of the course students will be able to

1. Learn different number systems and basic structure of computer system (L3)
2. Demonstrate the arithmetic algorithms (L4)
3. Explain the basic concepts of digital components and processor organization (L3)
4. Explain the generations of control signals of computer (L3)
5. Demonstrate the memory organization (L4)
6. Describe the concepts of parallel processing and different buses (L3)

UNIT – I:

Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers

UNIT – II:

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters

Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture

UNIT – III:

Computer Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

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UNIT – IV:

The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage

UNIT – V:

Input / Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

Textbooks:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.
3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.

Reference Books:

1. Computer Systems Architecture, M. Moris Mano, 3rdEdition, Pearson
2. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier
3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson

Online Learning Resources:

1. https://nptel.ac.in/courses/106/103/106103068/

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year - I Semester	Course Code: BT24CS2101	L	T	P	C
		3	0	0	3

ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS

Course Objectives:

The main objectives of the course are to

- provide knowledge on advance data structures frequently used in Computer Science domain
- Develop skills in algorithm design techniques popularly used
- Understand the use of various data structures in the algorithm design

Course Outcomes:

At the end of the course students will be able to

1. Analyze worst-case running times of algorithms using asymptotic analysis (L4).
2. Apply Divide-and-conquer paradigm and explain when an algorithmic design situation calls for it (L3).
3. Apply Greedy Method paradigm (L3).
4. Develop dynamic programming algorithms for various real time applications (L6).
5. Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms (L3).
6. Solve NP Completeness of problems (L5).

UNIT – I:

Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations.

AVL Trees – Creation, Insertion, Deletion operations and Applications B-Trees – Creation, Insertion, Deletion operations and Applications

UNIT – II:

Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications

Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications

Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull

UNIT – III:

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths

Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

UNIT – IV:

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem

Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

UNIT – V:

NP Hard and NP Complete Problems: Basic Concepts, Cook's theorem

NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP)

NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

Textbooks:

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2nd Edition Universities Press
2. Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press

Reference Books:

1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
4. Data Structures using C & C++: Langsam, Augenstein &Tanenbaum, Pearson, 1995
5. Algorithms + Data Structures & Programs:, N.Wirth, PHI
6. Fundamentals of Data Structures in C++: Horowitz Sahni & Mehta, Galgottia Pub.
7. Data structures in Java:, Thomas Standish, Pearson Education Asia

Online Learning Resources:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html
3. Abdul Bari, Introduction to Algorithms (youtube.com)

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year - I Semester	Course Code: BT24CS2102	L	T	P	C
		3	0	0	3

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Objectives:

The learning objectives of this course are to:

- identify Java language components and how they work together in applications
- Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
- learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
- understand how to design applications with threads in Java
- understand how to use Java APIs for program development

Course Outcomes:

At the end of the course students will be able to

1. Realize the concept of object oriented programming & Java programming constructs (L2).
2. Describe the basic concept of java such as operators, classes, objects (L2).
3. Describe the basic concept of java such as inheritance, packages, enumeration and various keywords (L2).
4. Apply the concepts of exception handling and Input / Output operations (L3).
5. Design the applications of Java & Java applet (L6)
6. Analyze & design the concept of Event handling and abstract window toolkit (L6)

UNIT I

Object Oriented Programming: Basic concepts, Principles,

Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators: Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf () Method, Static Variables and Methods, Attribute Final.

Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator? Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

UNIT II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three- dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto- boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)

UNIT V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, need for Multiple Threads Multithreaded Programming for Multi-Core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, Result Set Interface

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

Text Books:

1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2) Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
3) JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

References Books:

1) The complete Reference Java, 11thedition, Herbert Schildt, TMH
2) Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources:

1) https://nptel.ac.in/courses/106/105/106105191/
2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year - I Semester	Course Code: BT24CS2103	L	T	P	C
		0	0	3	1.5

ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB

Course Objectives:

The objectives of the course are to

- acquire practical skills in constructing and managing Data structures
- apply the popular algorithm design methods in problem-solving scenarios

Course Outcomes:

At the end of the course students will be able to

1. Analyze algorithms and determine algorithm correctness and time efficiency classes (L4)
2. Develop Programs for implementing trees and their traversal operations (L6)
3. Apply algorithm design techniques (L3)
4. Apply Greedy, divide and conquer algorithms (L3)
5. Develop dynamic programming algorithms for various real-time applications (L6)
6. Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms (L4)

Experiments covering the Topics:

- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Minimum cost spanning trees
- Shortest path algorithms
- 0/1 Knapsack Problem
- Travelling Salesperson problem
- Optimal Binary Search Trees
- N-Queens Problem
- Job Sequencing

Sample Programs:

1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by
   a) Adjacency Matrix b) Adjacency Lists
5. Write a program for finding the biconnected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.

8. Implement Job Sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound approach.

Reference Books:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, Sahni Sartaj, Mehta, Dinesh, 2nd Edition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill

Online Learning Resources:

1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year - I Semester	Course Code: BT24CS2104	L	T	P	C
		0	0	3	1.5

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course Objectives:

The aim of this course is to

- Practice object oriented programming in the Java programming language
- Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
- Illustrate inheritance, Exception handling mechanism, JDBC connectivity
- Construct Threads, Event Handling, implement packages, Java FX GUI

Course Outcomes:

At the end of the course students will be able to

1. Apply control structures and operators for writing basic python programs (L3).
2. List various python data structure concepts and apply them to solve real world problems (L3).
3. Develop functions and examine various file handling techniques and apply them to solve real world problems (L6).
4. Build simple Modules used for solving real world Problems (L6).
5. Analyze object oriented concepts in Python (L4).
6. Develop, test various GUI application (L6).

Experiments covering the Topics:

- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, Java FX GUI

Sample Experiments:

Exercise – 1:

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise - 2

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort

c) Write a JAVA program using String Buffer to delete, remove character.

Exercise - 3

a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.

b) Write a JAVA program implement method overloading.

c) Write a JAVA program to implement constructor.

d)Write a JAVA program to implement constructor overloading.

Exercise - 4

a) Write a JAVA program to implement Single Inheritance
b) Write a JAVA program to implement multi-level Inheritance
c) Write a JAVA program for abstract class to find areas of different shapes

Exercise - 5

a) Write a JAVA program give example for "super" keyword.
b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
c) Write a JAVA program that implements Runtime polymorphism

Exercise - 6

a) Write a JAVA program that describes exception handling mechanism
b) Write a JAVA program Illustrating Multiple catch clauses
c) Write a JAVA program for creation of Java Built-in Exceptions
d) Write a JAVA program for creation of User Defined Exception

Exercise - 7

a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds, (Repeat the same by implementing Runnable)
b) Write a program illustrating **is Alive** and **join ()**
c) Write a Program illustrating Daemon Threads.
d) Write a JAVA program Producer Consumer Problem

Exercise – 8

a) Write a JAVA program that import and use the user defined packages
b) Without writing any code, build a GUI that display text in label and image in an Image View (use JavaFX)
c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

Exercise – 9

a) Write a java program that connects to a database using JDBC
b)Write a java program to connect to a database using JDBC and insert values into it.
c) Write a java program to connect to a database using JDBC and delete values from it

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year - I Semester	Course Code: BT24CS2105	L	T	P	C
		0	1	2	2

PYTHON PROGRAMMING (SKILL ENHANCEMENT COURSE)

Course Objectives:

The main objectives of the course are to

- Introduce core programming concepts of Python programming language.
- Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
- Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

Course Outcomes:

At the end of the course students will be able to

1. Develop essential programming skills in computer programming concepts like datatypes, containers (L3)
2. Apply the basic of programming in the Python Language (L3)
3. Apply ode tasks related to conditional executions and loops (L3)
4. Apply coding tasks related to fundamental notations and techniques used in object oriented programming (L3)
5. Design and implement a program to solve a real world problem (L6)
6. Create a database connectivity in python programming language (L6)

UNTI-I:

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.

i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators

viii) Identity Operators

5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

UNIT-II:

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.
3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
   i. additionii. insertioniii. slicing
6. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III:

Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple () Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, using zip () Function, Sets, Set Methods, Frozenset.

Sample Experiments:

1. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed).
3. Write a program to check if a given key exists in a dictionary or not.
4. Write a program to add a new key-value pair to an existing dictionary.
5. Write a program to sum all the items in a given dictionary.

UNIT-IV:

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data

Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to create, display, append, insert and reverse the order of the items in the array.
5. Write a program to add, transpose and multiply two matrices.
6. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT-V:

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, dtype.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Python program to find min, max, sum, cumulative sum of array
6. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
    a) Apply head () function to the pandas data frame
    b) Perform various data selection operations on Data Frame
7. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

Reference Books:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Year - I Semester	Course Code: BT24BS2106	L	T	P	C
		2	0	0	-

ENVIRONMENTAL SCIENCE

Course Objectives:

To make the students to get awareness on environment

- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

Course Outcomes:

At the end of the course students will be able to

1. Grasp multidisciplinary nature of environmental studies and various renewable and non-renewable resources (L3).
2. Understand flow and bio-geo-chemical cycles and ecological pyramids (L2).
3. Understand various causes of pollution and solid waste management (L2).
4. Understand the various causes of pollution and its related preventive measures (L4).
5. About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation (L4).
6. Casus of population explosion, value education and welfare programmes (L3).

UNIT–I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems–Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies–Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. –Energy resources:

UNIT–II

Ecosystems: Concept to fan ecosystem. –Structure and function of an ecosystem–Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids–Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grass and ecosystem

c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation: Introduction Definition: genetic, species and ecosystem diversity–Bio-geographical classification of India–Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts– Endangered and endemic species of India –Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT–III

Environmental Pollution: Definition, Cause, effects and control measures of:

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and land- slides.

UNIT–IV

Social Issues and the Environment: From Unsustainable to Sustainable development–Urban problems related to energy – Water conservation, rain water harvesting, watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions–Climate change, global warming, acid-rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies –Wastel and reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act–Wild life Protection Act–Forest Conservation Act–Issues involved in enforcement of environment allegislation–Public awareness.

UNIT–V

Human Population and The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education–HIV/AIDS–Women and Child Welfare–Role of information Technology in Environment and human health–Case studies. Field Work: Visit to a local area to document environmental assets River/ forest grassland/ hill/ mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds–river, hills lopes, etc.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE & SYLLABUS M. Tech CSE for COMPUTER SCIENCE & ENGINEERING PROGRAMME

(Applicable for batches admitted from 2024-2025)

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I-SEMESTER

S. No	Course Code	Courses	Category	L	T	P	C
1	MT24CS1101	**Program Core-1 :** Mathematical Foundations of Computer Science	PC	3	0	0	3
2	MT24CS1102	**Program Core-2 :** Advanced Data Structures & Algorithms	PC	3	0	0	3
3		Program Elective-1	PE	3	0	0	3
	MT24CS1103	1. Big Data Analytics					
	MT24CS1104	2. Digital Image Processing					
	MT24CS1105	3. Advanced Operating Systems					
4		Program Elective-2	PE	3	0	0	3
	MT24CS1106	1. Advanced Computer Networks					
	MT24CS1107	2. Internet of Things					
	MT24CS1108	3. Object Oriented Software Engineering					
5	MT24CS1109	**Research Methodology and IPR**	CC			0	2
6	MT24CS1110	**Laboratory-1:** Advanced Data Structures & Algorithms Lab	LB	0	0	4	2
7	MT24CS1111	**Laboartory-2:** Advanced Computing Lab	LB	0	0	4	2
8	MT24CS1112	**Audit Course-1***	AC	2	0	0	0
Total Credits							18

Student has to choose any one audit course listed below.

II SEMESTER

S. No	Course Code	Courses	Category	L	T	P	C
1	MT24CS1201	**Program Core-3:** Machine learning	PC	3	0	0	3
2	MT24CS1202	**Program Core-4:** MEAN Stack Technologies	PC	3	0	0	3
3		Program Elective-3	PE	3	0	0	3
	MT24CS1203	1. Advanced Databases and Mining					
	MT24CS1204	2. Ad Hoc & Sensor Networks					
	MT24CS1205	3. Soft Computing					
4		Program Elective-4:	PE	3	0	0	3
	MT24CS1206	1. Cloud Computing					
	MT24CS1207	2. Principles of computer security					
	MT24CS1208	3. High Performance Computing					
5	MT24CS1209	**Laboratory-3:** Machine Learning with python lab	LB	0	0	4	2
6	MT24CS1210	**Laboartory-4:** MEAN Stack Technologies Lab	LB	0	0	4	2
7	MT24CS1211	**Mini Project with Seminar**	MP	2	0	0	2
8	MT24CS1212	**Audit Course-2 ***	AC	2	0	0	0
Total Credits							18

Student has to choose any one audit course listed below.

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Audit Course 1 & 2:

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills

III SEMESTER

S. No	Course Code	Courses	Category	L	T	P	C
1		**Program Elective-5**	PE	3	0	0	3
	MT24CS2101	1. Deep Learning					
	MT24CS2102	2. Social Network Analysis					
	MT24CS2103	3. MOOCs-1 (NPTEL/SWAYAM) 12 Week Program related to the programme which is not listed in the course structure					
2		**Open Elective**	OE	3	0	0	3
	MT24CS2104	MOOCs-2 (NPTEL/SWAYAM)-Any 12 Week Course on Engineering/ Management/ Mathematics offered by other than parent department					
	MT24CS2105	Course offered by other departments in the college					
3	MT24CS2106	**Dissertation-I/ Industrial Project #**	PJ	0	0	20	10
Total Credits							16

#Students going for Industrial Project/Thesis will complete these courses through MOOCs

IV SEMESTER

M. Tech. (CSE) IV SEMESTER

S. No	Course Code	Courses	Category	L	T	P	C
1	MT24CS2201	**Dissertation-II**	PJ	0	0	32	16
Total Credits							16

Open Electives offered by the Department of CSE

S. No	Course Code	Courses	Category	L	T	P	C
1	MT24CS2107	Python Programming	OE	3	0	0	3
2	MT24CS2108	Principles of Cyber Security		3	0	0	3
3	MT24CS2109	Internet of Things		3	0	0	3
4	MT24CS2110	Machine Learning		3	0	0	3
5	MT24CS2111	Digital Forensics		3	0	0	3
6	MT24CS2112	Next Generation Databases		3	0	0	3

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1101	L	T	P	C
		3	0	0	3

Mathematical Foundations of Computer Science

Course Objectives: This course is aimed at enabling the students to

- To understand the mathematical fundamentals that is prerequisites for variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems bioinformatics, Machine learning.
- To develop the understanding of the mathematical and logical basis to many modern techniques in computer science technology like machine learning, programming language design, and concurrency.
- To study various sampling and classification problems.

Course Outcomes:

After the completion of the course, student will be able to

- To apply the basic rules and theorems of probability theory such as Baye's Theorem, to determine probabilities that help to solve engineering problems and to determine the expectation and variance ofa random variable from its distribution.
- Able to perform and analyze of sampling, means, proportions, variances and estimates the maximumlikelihood based on population parameters.
- To learn how to formulate and test hypotheses about sample means, variances and proportions and todraw conclusions based on the results of statistical tests.
- Design various ciphers using number theory.
- Apply graph theory for real time problems like network routing problem.

UNIT I: Basic Probability and Random Variables: Random Experiments, Sample Spaces Events, the Concept of Probability the Axioms of Probability, Some Important Theorems on Probability Assignment of Probabilities, Conditional Probability Theorems on Conditional Probability, Independent Events, Bayes Theorem or Rule. Random Variables, Discrete Probability Distributions, Distribution Functions for Random Variables, Distribution Functions for Discrete Random Variables, Continuous Random Variables

UNIT II: Sampling and Estimation Theory: Population and Sample, Statistical Inference Sampling with and without Replacement Random Samples, Random Numbers Population Parameters Sample Statistics Sampling Distributions, Frequency Distributions, Relative Frequency Distributions, Computation of Mean, Variance, and Moments for Grouped Data. Unbiased Estimates and Efficient Estimates Point Estimates and Interval Estimates. Reliability Confidence Interval Estimates of Population Parameters, Maximum Likelihood Estimates

UNIT III: Tests of Hypothesis and Significance: Statistical Decisions Statistical Hypotheses. Null Hypotheses Tests of Hypotheses and Significance Type I and Type II Errors Level of Significance Tests Involving the Normal Distribution One-Tailed and Two-Tailed Tests P Value Special Tests of Significance for Large Samples Special Tests of Significance for Small Samples Relationship between Estimation Theory and Hypothesis Testing Operating Characteristic Curves. Power of a Test Quality Control Charts Fitting Theoretical Distributions to Sample Frequency Distributions, The Chi-Square Test for Goodness of Fit Contingency Tables Yates' Correction for Continuity Coefficient of Contingency.

UNIT IV: Algebraic Structures and Number Theory: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism. Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

UNIT V: Graph Theory: Basic Concepts of Graphs, Sub Graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Text Books:

1. Foundation Mathematics for Computer Science, John Vince, Springer.
2. Probability & Statistics, 3rd Edition, Murray R. Spiegel, John J. Schiller and R. Alu Srinivasan, Schaum's Outline Series, Tata McGraw-Hill Publishers
3. Probability and Statistics with Reliability, K. Trivedi, Wiley.
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, H.Rosen, Tata McGraw Hill.

Reference Books:

1. Probability and Computing: Randomized Algorithms and Probabilistic Analysis, M. Mitzenmacher and E. Upfal.
2. Applied Combinatorics, Alan Tucker, Wiley.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1102	L	T	P	C
		3	0	0	3

Advanced Data Structures & Algorithms

Course Objectives: From the course the student will learn

- Single Linked, Double Linked Lists, Stacks, Queues, Searching and Sorting techniques, Trees, Binarytrees, representation, traversal, Graphs- storage, traversal.
- Dictionaries, ADT for List, Stack, Queue, Hash table representation, Hash functions, Priority queues,Priority queues using heaps, Search trees.
- AVL trees, operations of AVL trees, Red- Black trees, Splay trees, comparison of search trees.

Course Outcomes:

After the completion of the course, student will be able to

- Ability to write and analyze algorithms for algorithm correctness and efficiency
- Master a variety of advanced abstract data type (ADT) and data structures and their Implementation
- Demonstrate various searching, sorting and hash techniques and be able to apply and solve problems of real life
- Design and implement variety of data structures including linked lists, binary trees, heaps, graphsand search trees
- Ability to compare various search trees and find solutions for IT related problems

UNIT I: Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. **Stacks and Queues**: Algorithm Implementation using Linked Lists.

UNIT II: Searching-Linear and Binary, Search Methods, **Sorting**-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort. **Trees**- Binary trees, Properties, Representation and Traversals (DFT, BFT), Expression Trees (Infix, prefix, postfix). **Graphs**-Basic Concepts, Storage structures and Traversals.

UNIT III: Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, **Open Addressing**-Linear Probing, DoubleHashing.

UNIT IV: Priority queues- Definition, ADT, Realizing a Priority Queue Using Heaps, Definition, Insertion, Deletion. **Search Trees**- Binary Search Trees, Definition, ADT, Implementation, **Operations**-Searching, Insertion, Deletion.

UNIT V: Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations-, Insertion, Deletion and Searching, Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletionand Searching, Comparison of Search Trees.

Text Books:

1. Data Structures: A Pseudo Code Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon and Cengage
2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni,University Press

Reference Books:

1. Data Structures and Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
2. Data Structures and Algorithms, 3/e, Adam Drozdek, Cengage
3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad and S Chand & Co, 2009

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1103	L	T	P	C
		3	0	0	3

Big Data Analytics

Course Objectives: This course is aimed at enabling the students to

- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSQL, Map Reduce,HIVE, Cassandra, Spark.
- To teach the fundamental techniques and principles in achieving big data analytics with scalabilityand streaming capability.
- To optimize business decisions and create competitive advantage with Big Data analytics

Course Outcomes:

After the completion of the course, student will be able to

- Illustrate on big data and its use cases from selected business domains.
- Interpret and summarize on No SQL, Cassandra
- Analyze the HADOOP and Map Reduce technologies associated with big data analytics andexplore on Big Data Applications Using Hive.
- Make use of Apache Spark, RDDs etc. to work with datasets.
- Assess real time processing with Spark Streaming.

UNIT I: What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data,mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.

UNIT II: Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, master-slave replication, peer- peer replication, sharding and replication, consistency, relaxing consistency, version stamps, Working with Cassandra ,Table creation, loading and reading data.

UNIT III: Data formats, analyzing data with Hadoop, scaling out, Architecture of Hadoop distributed file system (HDFS), fault tolerance ,with data replication, High availability, Data locality , Map Reduce Architecture, Process flow, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization. Introduction to Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, Logical joins, Window functions, Optimization, Table partitioning, Bucketing, Indexing, Join strategies.

UNIT IV: Apache spark- Advantages over Hadoop, lazy evaluation, In memory processing, DAG, Spark context, Spark Session, RDD, Transformations- Narrow and Wide, Actions, Data frames ,RDD to Data frames, Catalyst optimizer, Data Frame Transformations, Working with Dates and Timestamps, Working with Nulls in Data, Working with Complex Types, Working with JSON, Grouping, Window Functions, Joins, Data Sources, Broadcast Variables, Accumulators, Deploying Spark- On-Premises Cluster Deployments, Cluster Managers- Standalone Mode, Spark on YARN , Spark Logs, The Spark UI- Spark UI History Server, Debugging and Spark First Aid

UNIT V: Spark-Performance Tuning, Stream Processing Fundamentals, Event-Time and State full Processing - Event Time, State full Processing, Windows on Event Time- Tumbling Windows, Handling Late Data with Watermarks, Dropping Duplicates in a Stream, Structured Streaming Basics - Core Concepts, Structured Streaming in Action, Transformations on Streams, Input and Output.

Text Books:

1. Big Data, Big Analytics: Emerging, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj
2. SPARK: The Definitive Guide, Bill Chambers & Matei Zaharia, O'Reilley, 2018 Edition
3. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013
4. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World PolyglotPersistence", Addison-Wesley Professional, 2012
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012

Reference Books:

1. "Hadoop Operations", O'Reilley, Eric Sammer, 2012
2. "Programming Hive", O'Reilley, E. Capriolo, D. Wampler, and J. Rutherglen, 2012
3. "HBase: The Definitive Guide", O'Reilley, Lars George, 2011
4. "Cassandra: The Definitive Guide", O'Reilley, Eben Hewitt, 2010
5. "Programming Pig", O'Reilley, Alan Gates, 2011

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1104	L	T	P	C
		3	0	0	3

Digital Image Processing

Course Objectives:

- Describe and explain basic principles of digital image processing.
- Design and implement algorithms that perform basic image processing (e.g. noise removal and imageenhancement).
- Design and implement algorithms for advanced image analysis (e.g. image compression, imagesegmentation).
- Assess the performance of image processing algorithms and systems.

Course Outcomes:

After the completion of the course, student will be able to

- Demonstrate the components of image processing
- Explain various filtration techniques.
- Apply image compression techniques.
- Discuss the concepts of wavelet transforms.
- Analyze the concept of morphological image processing.

UNIT I: Introduction: Fundamental steps in Image Processing System, Components of Image Processing System, Elements of Visual Perception, Image Sensing and acquisition, Image sampling & Quantization, Basic Relationship between pixels. **Image Enhancement Techniques**: Spatial Domain Methods: Basic grey level transformation, Histogram equalization, Image subtraction, image averaging.

UNIT II: Spatial filtering: Smoothing, sharpening filters, Laplacian filters, Frequency domain filters, Smoothing and sharpening filters, Homomorphism is filtering. **Image Restoration & Reconstruction**: Model of Image Degradation/restoration process, Noise models, Spatial filtering, Inverse filtering, Minimum mean square Error filtering, constrained least square filtering, Geometric mean filter, Image reconstruction from projections. Color Fundamentals, Color Models, Color Transformations.

UNIT III: Image Compression: Redundancies- Coding, Interpixel, Psycho visual; Fidelity, Source and Channel Encoding, Elements of Information Theory; Loss Less and Lossy Compression; Run length coding, Differential encoding, DCT, Vector quantization, Entropy coding, LZW coding; Image Compression Standards-JPEG, JPEG 2000, MPEG; Video compression.

UNIT IV: Wavelet Based Image Compression: Expansion of functions, Multi-resolution analysis, Scaling functions, MRA refinement equation, Wavelet series expansion, Discrete Wavelet Transform (DWT), Continuous, Wavelet Transform, Fast Wavelet Transform, 2-D wavelet Transform, JPEG-2000 encoding.

UNIT V: Image Segmentation: Discontinuities, Edge Linking and boundary detection, Thresholding, Region Based Segmentation, Watersheds; Introduction to morphological operations; binary morphology- erosion, dilation, opening and closing operations, applications; basic gray-scale morphology operations; Feature extraction; Classification; Object recognition. **Digital Image Watermarking**: Introduction, need of Digital Image Watermarking, applications of watermarking in copyright protection and Image quality analysis.

Text Books:

1. Digital Image Processing. 2nd ed. Gonzalez, R.C. and Woods, R.E. India: Person Education, (2009)

Reference Books:

1. Digital Image Processing. John Wiley, Pratt, W. K, (2001)
2. Digital Image Processing, Jayaraman, S., Veerakumar, T. and Esakkiranjan, S. (2009),Tata McGraw-Hill

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1105	L	T	P	C
		3	0	0	3

Advanced Operating Systems

Course Objectives: This course is aimed at enabling the students to

- To provide comprehensive and up-to-date coverage of the major developments in distributed Operating System, Multi-processor Operating System and Database Operating System and to cover important theoretical foundations including Process Synchronization, Concurrency, Event ordering, Mutual Exclusion, Deadlock, Agreement Protocol, Security, Recovery and fault tolerance.

Course Outcomes:

After the completion of the course, student will be able to

- Illustrate on the fundamental concepts of distributed operating systems, its architecture and distributed mutual exclusion.
- Analyze on deadlock detection algorithms and agreement protocols.
- Make use of algorithms for implementing DSM and its scheduling.
- Apply protection and security in distributed operating systems.
- Elaborate on concurrency control mechanisms in distributed database systems.

UNIT-1: Architectures of Distributed Systems, System Architecture types, issues in distributed operating systems, communication networks, communication primitives. Theoretical Foundations, inherentlimitations of a distributed system, lamp ports logical clocks, vector clocks, casual ordering of messages, global state, cuts of a distributed computation, termination detection. Distributed Mutual Exclusion, introduction, the classification of mutual exclusion and associated algorithms, a comparative performanceanalysis.

UNIT-2: Distributed Deadlock Detection, Introduction, deadlock handling strategies in distributed systems, issues in deadlock detection and resolution, control organizations for distributed deadlock detection, centralized and distributed deadlock detection algorithms, hierarchical deadlock detection algorithms. Agreement protocols, introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, and applications of agreement algorithms. Distributed resource management: introduction-architecture, mechanism for building distributed file systems design issues, log structured file systems.

UNIT- 3: Distributed shared memory, Architecture, algorithms for implementing DSM, memory coherence and protocols, design issues. Distributed Scheduling, introduction, issues in load distributing, components of a load distributing algorithm, stability, load distributing algorithm, performance comparison, selecting a suitable load sharing algorithm, requirements for load distributing, task migration and associated issues. Failure Recovery and Fault tolerance: introduction, basic concepts, classification offailures, backward and forward error recovery, backward error recovery, recovery in concurrent systems, consistent set of check points, synchronous and asynchronous check pointing

UNIT- 4: Protection and security, preliminaries, the access matrix model and its implementations. - safety in matrix model, advanced models of protection. Data security, cryptography: Model of cryptography, conventional cryptography modern cryptography, private key cryptography, data encryption standard public key cryptography, multiple encryptions, authentication in distributed systems.

UNIT-5: Multiprocessor operating systems, basic multiprocessor system architectures, inter connection networks for multiprocessor systems, caching hypercube architecture. Multiprocessor Operating System, structures of multiprocessor operating system, operating system design issues, threads, process synchronization and scheduling. Database Operating systems: Introduction, requirements of a database operating system Concurrency control :Theoretical aspects, introduction, database systems, a concurrency control model of database systems, the problem of concurrency control, serializability theory, distributed database systems, concurrency control algorithms, introduction, basic synchronization primitives, lock based algorithms, timestamp based algorithms, optimistic algorithms, concurrency control algorithms,data replication.

Text Books:

1. "Advanced Concepts in Operating Systems: Distributed, Database and multiprocessor operating systems", Mukesh Singhal, Niranjan and G. Shivaratri, TMH, 2001

Reference Books:

1. "Modern Operating System", Andrew S. Tanenbaum, PHI, 2003
2. "Distributed Operating System-Concepts and design", Pradeep K. Sinha, PHI, 2003
   "Distributed Operating System", Pearson education, Andrew S. Tanenbaum, 2003

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1106	L	T	P	C
		3	0	0	3

ADVANCED COMPUTER NETWORKS

Course Objectives: This course is aimed at enabling the students to

- The course is aimed at providing basic understanding of Computer networks starting with OSI Reference Model, Protocols at different layers with special emphasis on IP, TCP & UDP and Routing algorithms.
- Some of the major topics which are included in this course are CSMA/CD, TCP/IP implementation, LANs/WANs, internetworking technologies, Routing and Addressing.
- Provide the mathematical background of routing protocols.
- Aim of this course is to develop some familiarity with current research problems and research methods in advance computer networks.

Course Outcomes:

After the completion of the course, student will be able to

- Illustrate reference models with layers, protocols and interfaces.
- Describe the routing algorithms, Sub netting and Addressing of IP V4and IPV6.
- Describe and Analysis of basic protocols of computer networks, and how they can be used to assist innetwork design and implementation.
- Describe the concepts Wireless LANS, WIMAX, IEEE 802.11, Cellular telephony and Satellite networks
- Describe the emerging trends in networks-MANETS and WSN

Unit-I: **Network layer:** Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets, Routing Algorithms-shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, **congestion control algorithms:** Approaches to congestion control, Traffic aware routing, Admission control, Traffic throttling, choke Packets, Load shedding, Random early detection, Quality of Service, Application requirements, Traffic shaping, Leaky and Token buckets

Unit-II: Internetworking and IP protocols: How networks differ, How networks can be connected, internetworking, tunneling, The network layer in the internet, IPV4 Protocol, IP addresses, Subnets, CIDR, classful and Special addressing, network address translation (NAT),IPV6 Address structure address space, IPV6 Advantages, packet format, extension Headers, Transition from IPV4 to IPV6 , Internet Control Protocols-IMCP, ARP, DHCP

Unit-III: Transport Layer Protocols: Introduction, Services, Port numbers,
User Datagram Protocol: User datagram, UDP services, UDP Applications, Transmission control Protocol: TCP services, TCP features, Segment, A TCP connection, State transition diagram, Windows in TCP, Flow control and error control, TCP Congestion control, TCP Timers,

Unit- IV: Wireless LANS: Introduction, Architectural comparison, Access control, The IEEE 802.11 Project: Architecture, MAC sub layer, Addressing Mechanism, Physical Layer, Bluetooth: Architecture, Bluetooth Layers **Other Wireless Networks:** WIMAX: Services, IEEE project 802.16, Layers in project 802.16, Cellular Telephony: Operations, First Generation (1G), Second Generation (2G), Third Generation (3G), Fourth Generation (4G), Satellite Networks: Operation, GEO Satellites, MEO satellites, LEO satellites.

Unit–V: Emerging trends in Computer networks:

Mobile computing: Motivation for mobile computing, Protocol stack issues in mobile computing environment, mobility issues in mobile computing, security issues in mobile networks, MOBILE Ad Hoc Networks: Applications of Ad Hoc Networks, Challenges and Issues in MANETS, MAC Layer Issues Routing Protocols in MANET, Transport Layer Issues, Ad hoc Network Security. **Wireless Sensor Networks:** WSN functioning, Operating system support in sensor devices, WSN characteristics, sensor network operation, Sensor Architecture: Cluster management, Wireless Mesh Networks: WMN design , Issues in WMNs, Computational Grids, Grid Features, Issues in Grid construction design, Grid design features,P2P Networks: Characteristics of P2P Networks, Classification of P2P systems, Gnutella, BitTorrent, Session Initiation Protocol(SIP) , Characteristics and addressing, Components of SIP, SIP establishment, SIP security.

Text Books:

1. Data Communications and Networking 4th edition Behrouz A Fourzan, TMH
2. Computer Networks 4th Edition Andrew S Tanenbaum, Pearson
3. Computer Networks, Mayank Dave, CENGAGE

Reference Books:

1. Computer Networks, A System Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1107	L	T	P	C
		3	0	0	3

Internet of Things

Course Objectives:

- To Understand Smart Objects and IoT Architectures.
- To learn about various IOT-related protocols
- To build simple IoT Systems using Arduino and Raspberry Pi.
- To understand data analytics and cloud in the context of IoT
- To develop IoT infrastructure for popular applications

Course Outcomes:

After the completion of the course, student will be able to

- Summarize on the term 'internet of things' in different contexts.
- Analyze various protocols for IoT.
- Design a PoC of an IoT system using Rasperry Pi/Arduino
- Apply data analytics and use cloud offerings related to IoT.
- Analyze applications of IoT in real time scenario

UNIT I: FUNDAMENTALS OF IoT: Evolution of Internet of Things, Enabling Technologies, IoT Architectures,one M2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT II: IoT PROTOCOLS: IT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT.

UNIT III: DESIGN AND DEVELOPMENT: Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks, Arduino, Board details, IDE programming, Raspberry Pi, Interfaces and Raspberry Pi with Python Programming.

UNIT IV: DATA ANALYTICS AND SUPPORTING SERVICES: Structured Vs Unstructured Data and Data in Motion Vs Data in Rest, Role of Machine Learning – No SQL Databases, Hadoop Ecosystem, Apache Kafka, Apache Spark, Edge Streaming Analytics and Network Analytics, Xively Cloud for IoT, Python Web Application Framework, Django, AWS for IoT, System Management with NETCONF-YANG.

UNIT V: CASE STUDIES/INDUSTRIAL APPLICATIONS: Cisco IoT system, IBM Watson IoT platform, Manufacturing, Converged Plant wide Ethernet Model (CPwE), Power Utility Industry, Grid Blocks Reference Model, Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

Text Books:

1.IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017

Reference Books:

1. Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015
2. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
3. "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
4. Architecting the Internet of Things, Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011.
5. Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, Michael Margolis, Arduino Cookbook and O'Reilly Media, 2011.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1108	L	T	P	C
		3	0	0	3

Object Oriented Software Engineering

Course Objectives:

- To elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project.
- To understand the what software life cycle is, how software projects are planned and managed, types of resources involved in software development projects, risks are identified and assessed, predictions and assessments are made.
- To identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements.

Course Outcomes:

After the completion of the course, student will be able to

- Apply the Object Oriented Software-Development Process to design software
- Analyze and Specify software requirements through a SRS documents.
- Design and Plan software solutions to problems using an object-oriented strategy.
- Model the object oriented software systems using Unified Modeling Language (UML)
- Estimate the cost of constructing object oriented software.

UNIT I: Introduction to Software Engineering: Software, Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges. Software Processes: Software Process, Process Classification, Phased development life cycle, Software Development Process Models, Process, use, applicability and Advantages/limitations.

UNIT II: Object oriented Paradigm, Object oriented Concepts, Classes, Objects, Attributes, Methods and services, Messages, Encapsulation, Inheritance, Polymorphism, Identifying the elements of object model, management of object oriented Software projects, Object Oriented Analysis, Domain Analysis, Generic Components of OOA model, OOA Process, Object Relationship model, Object Behavior Model.

UNIT III: Object Oriented Design: Design for Object- Oriented systems, The Generic components of the OO design model, The System design process, The Object design process, Design Patterns, Object Oriented Programming.

UNIT IV: Object Oriented testing: Broadening the view of Testing, Testing of OOA and OOD models, Object-Oriented testing strategies, Test case design for OO software, testing methods applicable at the class level, Interclass test case design.

UNIT V: Technical Metrics for Object Oriented Systems: The Intent of Object Oriented metrics, The distinguishing Characteristics, Metrics for the OO Design model, Class-Oriented metrics, Operation-Oriented Metrics, Metrics foe Object Oriented testing, Metrics for Object Oriented projects. CASE Tools.

Text Books:

1. Object oriented and Classical Software Engineering, 7/e, Stephen R. Schach,TMH.
2. Object oriented and Classical Software Engineering, Timothy Lethbridge,Robert Laganiere, TMH
3. Software Engineering by Roger S Pressman, Tata McGraw Hill Edition.

Reference Books:

1. Component based software engineering: 7th International symposium, ivicaCrnkovic, Springer, CBSE 2004

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1109	L	T	P	C
		2	0	0	2

RESEARCH METHODOLOGY AND IPR (MT24CS1105)

UNIT 1:

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT 2:

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT 3:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT 4:

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT 5:

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

REFERENCES:

(1) Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
(2) Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
(3) Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
(4) Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
(5) Mayall, "Industrial Design", McGraw Hill, 1992.
(6) Niebel, "Product Design", McGraw Hill, 1974.
(7) Asimov, "Introduction to Design", Prentice Hall, 1962.
(8) Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
(9) T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1110	L	T	P	C
		0	0	4	2

Advanced Data Structures & Algorithms Lab

Course Objectives:

From the course the student will learn

- Knowing about oops concepts for a specific problem.
- Various advanced data structures concepts like arrays, stacks, queues, linked lists, graphs and trees.

Course Outcomes:

After the completion of the course, student will be able to

- Identify classes, objects, members of a class and relationships among them needed for a specific problem.
- Examine algorithms performance using Prior analysis and asymptotic notations.
- Organize and apply to solve the complex problems using advanced data structures (like arrays, stacks, queues, linked lists, graphs and trees.)
- Apply and analyze functions of Dictionary

Experiment 1:

Write a java program to perform various operations on single linked list

Experiment 2:

Write a java program for the following

a) Reverse a linked list
b) Sort the data in a linked list
c) Remove duplicates
d) Merge two linked lists

Experiment 3:

Write a java program to perform various operations on doubly linked list.

Experiment 4:

Write a java program to perform various operations on circular linked list.

Experiment 5:

Write a java program for performing various operations on stack using linked list.

Experiment 6:

Write a java program for performing various operations on queue using linked list.

Experiment 7:

Write a java program for the following using stack

a) Infix to postfix conversion.
b) Expression evaluation.
c) Obtain the binary number for a given decimal number.

Experiment 8:

Write a java program to implement various operations on Binary Search TreeUsing Recursive and Non-Recursive methods.

Experiment 9:

Write a java program to implement the following for a graph.

a) BFS b) DFS

Experiment 10:

Write a java program to implement Merge & Heap Sort of given elements.

Experiment 11:

Write a java program to implement Quick Sort of given elements.

Experiment 12:

Write a java program to implement various operations on AVL trees.

Experiment 13:

Write a java program to perform the following operations:

a) Insertion into a B-tree b) Searching in a B-tree

Experiment 14:

Write a java program to implementation of recursive and non-recursive functions to Binary TreeTraversals

Experiment 15:

Write a java program to implement all the functions of Dictionary (ADT) using Hashing.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1111	L	T	P	C
		0	0	4	2

Advanced Computing Lab

Course Objectives:

From the course the student will learn

- The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

Course Outcomes:

After the completion of the course, student will be able to

- The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.
- Development and use of s IoT technology in Societal and Industrial Applications.
- Skills to undertake high quality academic and industrial research in Sensors and IoT.
- To classify Real World IoT Design Constraints, Industrial Automation in IoT.

Experiment 1: Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd,touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.

Experiment 2: Study and Install IDE of Arduino and different types of Arduino.

Experiment 3: Study and Implement Zigbee Protocol using Arduino / RaspberryPi.

Experiment 4: Write a map reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented.

Experiment 5: Data analytics using Apache Spark on Amazon food dataset, find all the pairs of itemsfrequently reviewed together.

Write a single Spark application that

- Transposes the original Amazon food dataset, obtaining a PairRDD of the type<user_id>→ <list ofthe product_ ids reviewed by user_id>
- Counts the frequencies of all the pairs of products reviewed together.
- Writes on the output folder all the pairs of products that appear more than once and their frequencies.The pairs of products must be sorted by frequency.

Experiment 6: Write a program to Implement Bankers algorithm for Dead Lock Avoidance.

Experiment 7: Write a program to Producer-consumer problem Using semaphores.

Experiment 8: Write a program for an image enhancement using pixel operation.

Experiment 9: Write a Program to enhance image using image arithmetic and logical operations.

Experiment 10: Write a program of bit stuffing used by Data Link Layer.

Experiment 11: Write a program to configure a Network using Distance Vector Routing protocol.

Experiment 12: Write a program to perform the function oriented diagram: DFD and Structured chart.

Experiment 13: Write a program to perform the system analysis: Requirement analysis, SRS.

Experiment 14: Write a program to draw the structural view diagram: Class diagram, object diagram.

Experiment 15: Write C programs for implementing the Demorgan's law.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - I Semester	Course Code: MT24CS1112	L	T	P	C
		2	0	0	0
Audit Course - 1					

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I Year - II Semester	Course Code: MT24CS1201	L	T	P	C
		3	0	0	3

Machine Learning

Course Objectives:

Machine Learning course will

- Develop an appreciation for what is involved in learning from data.
- Demonstrate a wide variety of learning algorithms.
- Demonstrate how to apply a variety of learning algorithms to data.
- Demonstrate how to perform evaluation of learning algorithms and model selection.

Course Outcomes:

After the completion of the course, student will be able to

- Domain Knowledge for Productive use of Machine Learning and Diversity of Data.Demonstrate on Supervised and Computational Learning
- Analyze on Statistics in learning techniques and Logistic RegressionIllustrate on Support Vector Machines and Perceptron Algorithm
- Design a Multilayer Perceptron Networks and classification of decision tree

Unit I: Introduction: Towards Intelligent Machines Well posed Problems, Example of Applications in diverse fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured / Unstructured, Forms of Learning, Machine Learning and Data Mining, Basic Linear Algebra in Machine Learning Techniques.

Unit II: Supervised Learning: Rationale and Basics: Learning from Observations, Bias and Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Over fitting Avoidance Heuristic Search in inductive Learning, Estimating Generalization Errors, Metrics for assessing regression, Metris for assessing classification.

Unit III: Statistical Learning: Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in learning techniques, Bayesian Reasoning: A probabilistic approach to inference, K-Nearest Neighbor Classifier. Discriminant functions and regression functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification, Minimum Description Length Principle.

Unit IV: Support Vector Machines (SVM): Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Large Margin Classifier for linearly seperable data, Linear Soft Margin Classifier for Overlapping Classes, Kernel Induced Feature Spaces, Nonlinear Classifier, and Regression by Support Vector Machines.

Learning with Neural Networks: Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear neuron and the Widrow-Hoff Learning Rule, The error correction delta rule.

Unit V: Multilayer Perceptron Networks and error back propagation algorithm, Radial Basis Functions Networks. **Decision Tree Learning**: Introduction, Example of classification decision tree, measures of impurity for evaluating splits in decision trees, ID3, C4.5, and CART decision trees, pruning the tree, strengths and weakness of decision tree approach.

Textbooks:

1. Applied Machine Learning,1st edition, M. Gopal, McGraw Hill Education,2018
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC) 1st Edition-2014

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William WHsieh, Cambridge Univ Press. *1* edition (August 31, 2009)
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley &SonsInc., 2nd Edition-2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
4. Machine Learning by Peter Flach , Cambridge-1st Edition 2012

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Department of Computer Science & Engineering

Course Content for Certificate Course

For I Year I Semester

Course Name	**Computer System Fundamentals**	Duration	**8 Weeks**
Course Type	**Core**	Category	**CSE**
Credit Points	**4**	Level	**Undergraduate**

Course Structure:

Week 1: Introduction to Computer Systems

Week 2: Storage Organization

Week 3: Software and Hardware

Week 4: Fundamental of Operating System

Week 5: Introduction to DBMS

Week 6: Fundamentals of Data Communication

Week 7: Introduction to Communication Devices

Week 8: Information Security Concerns

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Head of the Department
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Course Content for Certificate Course

For I Year II Semester

Course Name	**Introduction to Artificial Intellegence**	Duration	**12 Weeks**
Course Type	**Core**	Category	**CSE**
Credit Points	**4**	Level	**Undergraduate**

Course Structure:

Week 1: Introduction: Philosophy of AI, Definitions
Week 2: Modeling a Problem as Search Problem, Uninformed Search
Week 3: Heuristic Search, Domain Relaxations
Week 4: Local Search, Genetic Algorithms
Week 5: Adversarial Search
Week 6: Constraint Satisfaction
Week 7: Propositional Logic & Satisfiability
Week 8: Uncertainty in AI, Bayesian Networks
Week 9: Bayesian Networks Learning & Inference, Decision Theory
Week 10: Markov Decision Processes
Week 11: Reinforcement Learning
Week 12: Introduction to Deep Learning & Deep RL

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Department of Computer Science & Engineering

Course Content for Certificate Course

For II Year I Semester

Course Name	**Python Programming Using Django**	Duration	**14 Weeks**
Course Type	**Core**	Category	**CSE**
Credit Points	**4**	Level	**Undergraduate**

Course Structure:

Week 1: INTRODUCTION TO FRONT END

Html, CSS, JavaScript, Bootstrap.

Week 2: INTRODUCTION TO DJANGO

Features of Django, Django web server, Understanding Django environment, A simple 'Hello world' application.

Week 3: DISPLAYING HYPERLINKS - PROJECT

Django architecture, MVC and MTV, starting a project, Django apps, activating our first app, A view that displays a hyperlink, Mapping the views to URLs, Running our first app, Improving the views using templates, The improved templates, Template inheritance, Sending data from URL to view, Sending data from view to template

Week 4: CREATING A WEBSITE - PROJECT

Starting a project, creating an app inside the project, Activating the app, creating model for our site, Converting the model into a table, Examples for Fields in Models, Basic data access using Django shell, saving objects into database, retrieving objects from database, modifying objects of database, Sorting objects, Filtering objects, Deleting objects, Making changes in the data model

Week 5: CREATING ADMINISTRATION PANEL

Using the admin interface, Customizing the admin interface, adding users, Data access and modification using admin panel, Giving permissions to users.

Week 6: CREATING FIRST PAGE OF OUR SITE

The Django template system, Template Inheritance, Improving the website, adding background color for web pages, adding banner to the web site, adding background image in the web pages, Storing and displaying images, Adding users to our site, Uploading the information by user, Changing the administration interface title.

Week 7: DJANGO FORMS CREATION

Forms basics, Creating Contact Us form, Form field examples

Week 8: DJANGO's EMAIL FUNCTIONALITY

Configuring email settings, Sending emails with Django

Week 9: DJANGO TEMPLATE LANGUAGE

Django template tags, If/else, If/elif/else, For, Comments, Filters, using templates to display data in the site

Week 10: INTEGRATING BOOTSTRAP INTO DJANGO

Introduction to Bootstrap, creating tables, creating grids, Creating carousels

Week 11: SESSIONS AND COOKIES

Difference between session and cookie, Creating sessions and cookies in Django.

Week 12: USING OTHER DATABASES IN DJANGO

Using SQLite, Configuring MySQL database, Working with MySQL in Django

Configuring Oracle database, Working with Oracle in Django

Week 13: DJANGO RESTful API

CRUD operations

Week 14: LIVE PROJECT IMPLEMENTATION

Project life cycle

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Department of Computer Science & Engineering

Course Content for Certificate Course

For II Year II Semester

Course Name	**Data Science for Engineers**	Duration	**8 Weeks**
Course Type	**Core**	Category	**CSE**
Credit Points	**4**	Level	**Undergraduate**

Course Structure:

Week 1: Course Philosophy and introduction to R
Week 2: Linear algebra for data Science
- i) Algebraic view – vectors, matrices, products of matrix & vectors, rank, null space, solution of over-determined set of equations and pseudo-inverse)
- ii) Geometric view-vectors, distance, projections, eigenvalue decomposition

Week 3: Statistics (descriptive statistics, notion of probability, distributions, mean, variance, covariance, covariance matrix, understanding univariate and multivariate normal distributions, introduction to hypothesis testing, confidence interval for estimates)
Week 4: Optimization
Week 5: 1. Optimization
2. Topology of data science problems and a solution framework

Week 6: 1. Simple linear regression and verifying assumptions used in linear regression.
2. Multivariate linear regression model assessment, assessing importance of different variable, subset selection.

Week 7: Classification using logistic regression.
Week 8: Classification using KNN and k-means clustering

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Head of the Department

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DEPARTMENT OF MECHANICAL ENGINEERING

Dt: 02-05-2025.

To
The Principal,
DNRCET (A).

Sir,

Sub: Ratification of Design Thinking & Innovation with subject code BT24ME2207 (DR24) in BOS of ME Dept - Regd

I would like to bring to your notice that the subject **"Design Thinking & Innovation"** with subject code **BT24ME2207**is ratified in our Department's Board of Studies (BOS) meeting.

I request all the departments having the **Design Thinking & Innovation** subject in their course structure to follow the enclosed syllabus and the subject code.

Thanking you sir,

Yours Sincerely,

2/5/25

Dr. I. Harish
HoD, Department of Mechanical Engineering
D.N.R. College of Engineering & Technology

Head of the Department
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Copy to.

HODs	CE	EEE	ECE	CSE	MBA.
	IT	AIML		AIDS	

UNIT – V Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

Online Learning Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

Course Outcomes:

COs	Statements	Blooms Level
CO1	Define the concepts related to design thinking.	L1
CO2	Explain the fundamentals of Design Thinking and innovation.	L2
CO3	Apply the design thinking techniques for solving problems in various sectors.	L3
CO4	Analyse to work in a multidisciplinary environment.	L4
CO5	Evaluate the value of creativity.	L5

2/5/25

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DEPARTMENT OF MECHANICAL ENGINEERING

II Year II Semester

L	T	P	C
1	0	2	2

DESIGN THINKING & INNOVATION (BT24ME2207)

Course Objectives: The objectives of the course are to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

UNIT – I Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT - II Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT - III Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT - IV Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

21/5/25

Head of the Department
Mechanical Engg
D.N.R. College of Engg. & Tech
BHIMAVARAM-534 202

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BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

Ph: 08816-221238, Email: dnrcet@gmail.com , Website: https://dnrcet.org

Department of Electronics & Communication Engineering

To

The Head of the Department,
Department of EEE / ME / CSE / AI & ML / AI & DS / IT,
DNR College of Engineering & Technology,
Balusumudi, BHIMAVARAM – 534202,
West Godavari District, A.P., India.

Respected Sir,

Sub: Submission of Course Syllabus of offered to concern department(s) – Reg.

* * *

I Dr. K. Venu Gopal, Associate Professor & Head, Department of ECE herewith submitting the course syllabus along with the minutes, approved in the BoS meeting of the department. Kindly go through the syllabus for the academic year 2025 -2026.

Thanking You,

Yours Faithfully,

(Dr. K. Venu Gopal)
Associate Professor & Head,
Department of ECE, DNRCET (A).

Copy submitted to:

Department	EEE	ME	CSE	AI & ML	AI & DS	IT
Signature of HoD						

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Bhimavaram,
26/03/2025.

Ref: DNRCET/ECED/2025-26/BOS-MOM/1

Minutes of Meeting (MOM) of the Board of Studies (BOS)

The 2nd Board of Studies (BOS) meeting for the A.Y: 2025-26 of the Electronics & Communication Engineering (ECE) Department was held on Wednesday, 26/03/2025, at 10:30 AM in the R & D Lab in online mode (Zoom online meeting platform) to discuss the proposed agenda and to adopt resolutions.

Meeting link
https://us06web.zoom.us/j/84974670871?pwd=SMklaoufKbpwfBLwuOyJhzuTtmqe6J.1

Agenda:

1. **Welcome Speech by the Chairperson.**
2. **Introducing the members of the Board of Studies.**
3. **To discuss and finalize the proposed II B. Tech. I & II Semester Course Structure and Syllabus & II M. Tech III & IV Semester of DR-24 Regulations.**
4. **Ratification of Course Objectives and Course Outcomes for the Proposed Curriculum.**
5. **Finalization of Model Question Papers.**
6. **Any other item with the permission of the chair.**

The following members attended the meeting:

Name(s) of the Member(s)/Nominee(s)	Designation in Committee	Signature
Dr. K. Venu Gopal	**Chairperson**	K Venu Gopal
Dr. B. T Krishna, Professor, ECE Department, University College of Engineering, Kakinada, AP-533003. e-mail: tkbattula@jntucek.ac.in Mobile: 9502770755.	**Member** **(University Nominee)**	B. T. Krishna
Dr. N. Udaya Kumar, Professor & HOD, ECE Dept,	**Member**	On-Line Attended.

SRKR Engineering. College (Autonomous), Bhimavaram-534202, e-mail: nuk@srkrec.ac.in Mobile: 9440354093.	**(Subject experts from outside the parent University)**	
Dr. P. Srinivasa Rao, Assoc. Professor, ECE Dept., St. Anna's College of Engineering & Technology (Autonomous), Chirala-523187 e-mail: psraoece@gmail.com Mobile: 6281266754.	**Member** **(Subject experts from outside the parent University)**	On-Line Attended
Mr. Sriramulu Govada, Design. Technical Officer 'A', DRDO, Visakhapatnam, e-mail: sriramgovada@gmail.com Mobile: 9492126360.	**Member** **(Industrial Expert)**	On-Line Attended
Mrs. I. Pavani, 2016-20 Batch, Roll No.169P1A0416, e-mail: pavaniindukuri123@gmail.com, Mobile No: 63039 84842.	**Member** **(College alumni)**	On-Line Attended.
Dr. Nekkanti Venkata Rao	**Members of the Department**	
Dr A. Purna Ramesh		
Dr. S. Ravi chandh		
Mr. Kopalli Venkanna Naidu		
Mr. Kurma Sekhar Babu		
Mr. S Satish Kumar		
Mrs. N Mary Leena		

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Mr.M. Venu		
Mrs.K Indira Priyadarsini		
Mrs. B. Nagamani		
Mrs. Rosey Sharon		
Mr. P. Gopala Swami		
Mr. Rakesh Patnaik		
Mrs. P. Srivalli		
Mr. Vendra Bhavani Durga		
Mrs. K. Durga		
Mr.B. Sudhakar		
Mrs. K. Vanaja		
Mrs. U. Sai Mounica		
Mr.S. Joseph		

The BoS meeting began with the DNRCET Principal thanking the university nominee and other members of the BoS. He then turned the session over to Dr. K. Venu Gopal, the BOS chairman of the ECE department. The following resolutions were established during the BoS meeting:

Resolutions:

Agenda Point 1: Welcome speech by the chairperson

Resolution: The chairman of BoS, Dr. K. Venu Gopal, welcomed internal and external BOS members.

Agenda Point 2: Introduction of members

Resolution: The Chairman of BoS, Dr. K. Venu Gopal, welcomed all the members and introduced internal BoS members to external BoS members.

The meeting began with the II B. Tech curriculum presentation for semesters I & II.

Agenda Point 3: To discuss and finalize the proposed II B. Tech-I & II Semester ECE (Theory and Lab) courses & II M. Tech DECS III & IV Semester (Theory and Lab) of DR24 Regulations.

Resolution: After clearly discussing every unit of theory courses, namely Probability Theory and Stochastic Process, Signals and Systems, Electronic Devices and Circuits, Switching Theory and Logic Design, Electronic Devices and Circuits Lab, Switching Theory and Logic Design Lab Linear Control Systems, Electromagnetic Waves and Transmission Lines, Electronic Circuit Analysis, Analog Communications, Signals and Systems Lab, Electronic Circuit Analysis Lab, and various open electives offered by ECE Department namely 1. Basics of Signals and Systems

2. Electronic Measurements and Instrumentation 3. Principles of Signal Processing 4. Industrial Electronics 5. Consumer Electronics 6. Fundamentals of Microprocessors and Microcontrollers 7. Transducers and Sensors 8. IOT and Applications 9. IC Applications 10. Principles of Communications 11. Basic Electronics 12. Data Communications 13. Digital Logic design and Embedded Systems & IoT lab for II B.Tech-I semester, ME department. In this meeting, the finalization of course content for the Digital Logic & Computer Organization course for II B. Tech-I semester for CSE, IT and allied branches of CSE (AIDS &AIML) for II B. Tech-II semester and Analog Circuits for II B. Tech-II semester EEE department is completed. After the discussion of II B. Tech-I & II Semesters courses, the chairman and all BoS members discussed the course of II M. Tech III & IV Semester the courses are Detection & Estimation Theory, Advanced Digital Signal Processing, Coding Theory and Applications, Operations Research, Dissertation Phase -I & Dissertation Phase - II.

After Conversation, the university nominee and all the other BoS members finalized that the same syllabus and regulations in R23 are in corporate in DR 24 II B. TECH I & II syllabus and regulations DR 24 II M. Tech III & IV semester syllabus is same as JNTUK K Kakinada R19 regulations The detailed syllabus is attached.
Annexure-A **(Enclosed Annexure-A).**

Agenda Point- 4: Ratification of Course Objectives and Course Outcomes for the proposed subjects.

Resolution: After an extensive discussion, the BoS approved the proposed course objectives and outcomes. These are based on the changes made to the theory and labs as mentioned in agenda point -3.

Agenda Point- 5: Finalization of Model Paper. `

Resolution: The BoS members suggested appropriately naming the COs in the order that the questions stipulated and substituting Bloom's Level (BL) for KL (Knowledge Level). They also recommended giving a few long-answer questions a score of four or six out of ten. Accordingly, following confirmation of the Course Objectives (COs), Bloom's Taxonomy levels, and mark distribution, the suggested model question papers for external examinations of theory courses were approved. Annexure-B **(Enclosed Annexure -B).**

Agenda Point 6: Any other item with the permission of the chair.

Resolution: The Chairman concluded with a vote of thanks after summarizing the agenda and resolutions and thanking each member of the Board of Studies for their cooperative efforts.

Note: All conversations from the BoS meetings are captured on the Zoom platform and kept in the Department's records.

K Venu Gopal
Chairman, BoS

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-I Semester	Course Code: BT24EC2107	L	T	P	C
		3	0	0	3

Digital Logic & Computer Organization

Course Objectives:

The main objectives of the course is to

- provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals
- Describe memory hierarchy concepts
- Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

Course Outcomes:

At the end of the Course, Student will be able to:

- To learn different number systems and basic structure of computer system.
- To demonstrate the arithmetic algorithms.
- To explain the basic concepts of digital components and processor organization.
- To explain the generation of control signals of computer.
- To demonstrate the memory organization.
- To describe the concepts of parallel processing and different Buses.

UNIT – I:

Data Representation: Binary Numbers Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes.

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers.

UNIT – II:

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters.

Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von-Neumann Architecture.

UNIT – III:

Computer Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control.

UNIT – IV:

The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

UNIT – V:

Input / Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

Textbooks:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6th edition, McGraw Hill.
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.
3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.

Reference Books:

1. Computer Systems Architecture, M. Moris Mano, 3rdEdition, Pearson.
2. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier.
3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson.

Online Learning Resources:

1. https://nptel.ac.in/courses/106/103/106103068/

Head
Department of ECE
D.N.R. College of Engg. & Tech
BHIMAVARAM-534 202.

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Ph: 08816-221238 Email: dnrcet@gmail.com website: https://dnrcet.org

DEPARTMENT OF CIVIL ENGINEERING

Date:03-05-2025

To
The Head of the Department
Basic Sciences & Humanities (BS&H)
DNRCET (A)
Bhimavaram

Subject: Submission of Ratified Copy – Environmental Science-Civil BoS 2-Reg

Respected Sir

We wish to inform you that the Civil Engineering Department's Board of Studies (BOS) meeting was held on **04-04-2025**, and the proceedings have been duly ratified.

As part of the agenda, the subject **"Environmental Science"** for **II Year I Semester (2-1)** with the subject code **BT24BS2106** was also ratified.

In this regard, we wish to bring to your notice that the ratified syllabus copy has been submitted to you directly for your reference

Thank you for your cooperation and support.

Enclosures:

1. BOS Minutes of Meeting-(Page 1)
2. Syllabus Copy of Environmental science

Yours sincerely,

03/05/2025

Head of the Department
Civil Engineering
DNR College of Engg. & Tech.
BHIMAVARAM-534 202.

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DEPARTMENT OF CIVIL ENGINEERING

Second BOS Meeting (A.Y. 2025-26)

Venue: Board Room, DNRCET (A)

Date & Time: 04-04-2025 & 10.20 AM-12.20PM

Mode of conducting meeting: Zoom (online platform)

Meeting link:

https://us06web.zoom.us/j/2664871556?pwd=pFKnG7HYNLabpf3yYPHq0tnDoHPNdj.1&omn=88569248416

Agenda:

1. To Discuss the detailed syllabus for B.Tech (DR24) Second Year, First & Second Semesters.
2. To Discuss the Academic Regulations of the B.Tech (DR24) Second Year.
3. To Discuss B.Tech eligibility criteria for Honors & Minors.
4. To Discuss the detailed syllabus for M.Tech (DR24) Second Year, First & Second Semesters.
5. To Discuss the Academic Regulations of the M.Tech (DR24) Second Year.
6. Any other item with the permission of the chair.

Minutes of meeting with the following Resolutions

Dr.B.V.Ramana Murthy, Head of the Department & Chairman, BOS Civil Engineering, welcomed and introduced the eminent members of BOS Meeting. The chairman of BOS placed the agenda for the deliberation of the members. The BOS members expressed their appreciation for novel structure of curriculum and content of the course. The following deliberations were made as per the items of circular agenda.

1. **Discussed the detailed syllabus for B.Tech (DR24) Second Year, First & Second Semesters**

i) The title of the subjects, along with their respective credits and categories, for the B.Tech Second Year - First and Second Semesters have been listed and the detailed syllabus of each subject have been discussed.

ii) Some modifications have been suggested in the **Strength of Materials lab** (II year – I semester) and **Structural Analysis** course (II year – II semester)

iii) **Environmental Science (Audit Course):** The detailed syllabus of this course has been discussed for approval in the Civil Engineering Board of Studies (BoS) meeting.

ANNEXURE-II

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DEPARTMENT OF BASIC SCIENCES & HUMANITIES

Year/Semester	II.B.Tech-I Sem	L	T	P	C
Regulation Year	DR-24	2	0	0	-
Name of the Subject	**Environmental science (BT24BS2106)**				
Branch	**Common For All Branches (CE, EEE, ME ,ECE, CSE, IT, AIML,AIDS)**				

Course Objectives:

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future.
- To save earth from the inventions by the engineers.

Course Outcomes:

COs	STATEMENTS	Blooms Level
CO1	Grasp multidisciplinary nature of environmental studies and various renewable and non-renewable resources.	Remembered
CO2	Understand flow and bio-geo-chemical cycles and ecological pyramids.	Understand
CO3	Understand various causes of pollution and solid waste management and related preventive measures	Understand
CO4	Solid Waste Management: Causes, effects and control measures of urban and industrial Wastes.	Create
CO5	About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation	Apply
CO6	Casus of population explosion, value education and welfare programmes	Analyze

UNIT – 1: Multidisciplinary Nature of Environmental Studies

Definition, Scope and Importance – Need for Public Awareness Natural Resources :Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems– Mineral resources :Use and exploitation, environmental effects of extracting and using mineral resources, case studies– Food resources :World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity ,case studies.–Energy resources:

UNIT – II: Ecosystems:

Concept to of an ecosystem.–Structure and function of an ecosystem–Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and

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ecological pyramids–Introduction, types, characteristic features, structure and function of the following ecosystem:
a) Forest ecosystem.
b) Grassl and ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
Biodiversity And Its Conservation: Introduction Definition: genetic, species and ecosystem diversity–Bio-geographical classification of India–Value of biodiversity: consumptive use Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and locallevels - India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss,poaching of wildlife, man-wildlife conflicts– Endangered and endemic species of India - Conservation of biodiversity:In-situand Ex-situ conservation of biodiversity.

UNIT – III: Environmental Pollution

Environmental Pollution: Definition, Cause, effects and control measures of:
a) Air Pollution.
b) Water pollution
c) Soil pollution
d) Marine pollution
e) Noise pollution
f) Thermal pollution
g) Nuclear hazards
Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earth quake, cyclone and landslides.

UNIT – IV: Social Issues and the Environment

From Unsustainable to Sustainable development– Urban problems related to energy – Water conservation, rain water harvesting, watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions–Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wastel and

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reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act–Wild life Protection Act–Forest Conservation Act–Issues involved in enforcement of environment allegislation –Public awareness.

UNIT – V: Human Population And The Environment

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education– HIV/AIDS–Women and Child Welfare–Role of information Technology in Environment and human health–Case studies. Field Work: Visit to a local area to document environmental assets River/ forest grassland/ hill/ mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds–river, hills lopes, etc..

Text Books:

1) Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission,Universities Press.
2) Palaniswamy, "Environmental Studies ",Pearson education
3) S.AzeemUnnisa,"Environmental Studies"Academic Publishing Company
4) K.RaghavanNambiar,"Text book of Environmental Studies for UndergraduateCourses as per UGC model syllabus", Scitech Publications (India), Pvt.Ltd.

Reference Books:

1)Deeksha Dave and E .Sai Baba Reddy, "Text book of Environmental Science", Cengage Publications.
2)M.AnjiReddy, "Text book of Environmental Sciences and Technology",BSPublication.
3) J.P.Sharma, Comprehensive Environmental studies,Laxmi publicati
4) J.GlynnHenryandGaryW.Heinke,"Environmental Sciences and Engineering",Prentice Hall of India Private limited
5) G.R.Chatwal,"A Text Book of Environmental Studies"Himalaya Publishing House
6) Gilbert M.Masters and WendellP.Ela,"Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited

CSE

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DEPARTMENT OF BASIC SCIENCE AND HUMANITIES

Dept of Basic Sciences & Humanities (Mathematics) Meeting of B O S Schedule, A. Y. 2025-26

Minutes of meeting of Board of Studies, Dept of Basic Sciences & Humanities (Mathematics) Held on 04-04-2025 at 09:30 A. M with the following points of agenda.

Venue: English Language Lab
Meeting held on: 04-04-2025 at 10:30 A. M
Mode of conducting meeting: Online Zoom App
Meeting link:

https://us05web.zoom.us/j/85622006591?pwd=e1XaO4KGbua0hl3ih68GP7V54KcJCu.1

Agenda:

1. Welcome speech by Chairperson
2. Introduction of members
3. To discuss and finalize the proposed DR -24 syllabus for II B. Tech I & II Semester for A.Y; 2025-26 onwads. [Annexure-A]
4. Finalization of Model question Paper and List of question Paper Setters.[Annexure-B]
5. To discuss and finalize the Evaluation procedure for Continuous Internal Evaluation(CIE) and Semester End Evaluation (S E E) [Annexure- C]
6. Ratification of Course Objectives and Course Outcomes, C O–P O mapping for the proposed subjects [Annexure- D].
7. Finalization of Text Books and Reference Books.[Annexure-E]
8. Any other item with the permission of the chairman.

Members Present:

S. No.	Name(s) of the Member(s)/	Designation	Designation in Committee	Status Attending	Signature
1.	Dr G G Ratnam	Professor & Head, Dept of B S&H	Chairperson	Yes	
2.	Dr V Ravindranath	Professor & Head, Dept of Mathematics J NT UK, Kakinada	Member (University Nominee)	Yes	
3.	Dr M Pushpa Latha	Dept of Mathematics S RK R Engineering College, Bhimavaram	Member (Subject expert)	Yes	online
4.	Dr Sd Sadik	Professor &H OD Dept of FED, C RR Engineering College, Eluru	Member(Subject expert)	Yes	online
5.	Ms. P Keerthi	Asst. Prof, DNRCET	Member	Yes	
6.	Mrs. G Teja Sowmya	Asst. Prof, DNRCET	Member	Yes	
7.	Mrs. V Vijaya Durga	Asst. Prof, DNRCET	Member	Yes	
8.	Mrs. N Madhavi	Asst. Prof, DNRCET	Member	Yes	
9.	Ms. P Venu Madhuri	Asst. Prof, DNRCET	Member	Yes	
10.	Mr. B. Pradeep	Asst. Prof, DNRCET	Member	Yes	
11.	Mrs. K Ramya Sri Krishna	Asst. Prof, DNRCET	Member	Yes	
12.	Mr. T. Pranams	Managing Director Pranams Hotels, Bhimavaram	Member (Industrial Expert)	Yes	
13.	Ms. K. Siva Syamala	R. No:149 P5 A0503 Batch:2013-17	Member (College alumni)	Yes	K.S.Syamala

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DEPARTMENT OF BASIC SCIENCE AND HUMANITIES

Resolutions

At the outset, Dr M Anjan Kumar , Principal of DNRCET presented his gratitude to the university nominee Dr V Ravindranath and other members of BOS Subject experts Dr Sd Sadik and Dr M Pushpa Latha for their support and cooperation and handed over the session to the chairman of B O S.

Resolutions-1:

The chair person of the BOS greeted the university nominee Prof. Dr.Ravidranath and other subject experts. On the behalf of DNRCET, he welcome all BOS members.

Resolutions-2:

The BOS chairman welcomed and introduced the eminent members of BOS to the Meeting. He briefed them about structure and pattern of the course. The BOS members expressed their appreciation for structure of curriculum and content of the course. The chairman of B O S placed the agenda for the deliberation of the members. The following deliberations were made as per the items of circular agenda.

Resolutions-3:

After through discussions, the BOS considered and approved, the DR24 course structure and syllabus for II B Tech I&II semesters (U G) courses to be taught by faculty of Mathematics, Department of Basic Sciences and Humanities (B S H) from the academic year 2025-26 onwards.

The list of II B.Tech I & II semesters subjects are approved by the BOS members.

Subjects:

1. Numerical Techniques and Statistical Methods
2. Complex Variables and numerical methods
3. Numerical Methods and Transform Techniques
4 Discrete Mathematics and graph theory
5. Complex Variables, Probability and statistics
6. Probability and statistics
7. Statistical methods for data science

Resolutions-4:

The BOS discussed and approved of the model question papers and list of question paper setters.[Annexure-B]

Resolutions-5:

The BOS discussed and approved the evaluation procedure of Continuous Internal Evaluation (CIE) and Semester End Evaluation (S E E) [Annexure-C]

Resolutions-6:

The BOS approved Course Objectives and six Course Outcomes from five units of all II B.Tech I & II semesters course and CO – P O Mapping of the Mathematics courses. [Annexure-D]

Resolutions-7:

The BOS discussed and suggested the text books and reference books for all Mathematics courses and also suggested to prefer local author text book for the benefit of the rural background students. [Annexure-E]

Resolutions-8:

The JNTUK nominee has suggested that Probability and Stotastic Process should be changed from BSH to professional core.

At the end , the chairman concluded the BOS meeting by summarizing all the agenda points and resolutions.

[Annexure-A]

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DEPARTMENT OF BASIC SCIENCE AND HUMANITIES

DR 24 - II Year COURSE STRUCTURE & SYLLABUS
COMPUTER SCIENCE ENGINEERING

B. Tech. II Year–I Semester

S. No	Category	Title	L	T	P	C
1	B S&H	Discrete Mathematics & Graph Theory	3	0	0	3
2	B S&H	Universal human values –understanding harmony and Ethical human conduct	2	1	0	3
3	Engineering Science	Digital Logic & Computer Organization	3	0	0	3
4	Professional Core	Advanced Data Structures & Algorithm Analysis	3	0	0	3
5	Professional Core	Object Oriented Programming Through Java	3	0	0	3
6	Professional Core	Advanced Data Structures and Algorithm Analysis Lab	0	0	3	1.5
7	Professional Core	Object Oriented Programming Through Java Lab	0	0	3	1.5
8	Skill Enhancement Course	Python Programming	0	1	2	2
9	Audit Course	Environmental Science	2	0	0	-
Total			16	2	8	20

B. Tech. II Year–II Semester

S. No	Category	Title	L	T	P	C
1	Management Course-I	Managerial Economics and Financial Analysis	2	0	0	2
2	Engineering Science/ Basic Science	Probability & Statistics	3	0	0	3
3	Professional Core	Operating Systems	3	0	0	3
4	Professional Core	Database Management Systems	3	0	0	3
5	Professional Core	Software Engineering	2	1	0	3
6	Professional Core	Operating Systems Lab	0	0	3	1.5
7	Professional Core	Database Management Systems Lab	0	0	3	1.5
8	Skill Enhancement Course	Full Stack Development–I	0	1	2	2
9	B S&H	Design Thinking & Innovation	1	0	2	2
			Total	14	2	10
Mandatory Community Service Project Internship of 08 weeks duration during Summer vacation						

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[Annexure-A]

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DEPARTMENT OF BASIC SCIENCE AND HUMANITIES

II Year I Semester

DISCRETEMATHEMATICS AND GRAPHTHEORY

For CSE,CSE (AI&ML),AI&DS,IT

Course Objectives:

- To introduce the students to the topics and techniques of discrete methods and Combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

Course Outcomes:

At the end of the course students will be able to

1. Build skills in solving mathematical problems
2. Comprehend mathematical principles and logic
3. Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
4. Differentiate between ordinary and circular permutations
5. Manipulate and analyzed at a numerically and/ or graphically using appropriate Software
6. How to communicate effectively mathematical ideas/results verbally or in writing

UNIT–I: Mathematical Logic

Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological
Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus

UNIT-II: Set Theory

Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams, Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties.

UNIT-III: Combinatorics and Recurrence Relations

Basis of Counting, Permutations, Permutations with Repetitions, Circular and Restricted Permutations. Combinations, Restricted Combinations, Binomial and Multinomial Coefficients and Theorems.

Recurrence Relations

Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving in homogeneous Recurrence Relation

UNIT-I V:Graph Theory

Basic Concepts, Graph Theory and its Applications, Subgraphs, Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs

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Unit-V: Multi Graphs

Multigraphs, Bipartite and Planar Graphs, Euler's Theorem, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Prim's and Kruskal's Algorithms, B F S and D F S
Spanning Trees

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Trembly and P. Manohar, Tata Mc Graw Hill.
2. Elements of Discrete Mathematics–A Computer Oriented Approach, C. L. Liuand D. P. Mohapatra, 3rd Edition, Tata Mc Graw Hill.
3. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, Mc Graw Hill.

REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel and T. P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busbyand Sharon Cutler Ross, P H I.
3. Discrete Mathematics, S. K. Chakraborthy and B. K. Sarkar, Oxford, 2011.
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K.H. Rosen, 7th Edition, Tata Mc Graw Hill.

08/04/2025

8/4/25

8/4

8/4/2025

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[Annexure-A]

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II Year II Semester

PROBABILITY AND STATISTICS

For CSE, CSE (AI&ML),IT

Course Objectives:

- To familiarize the students with the foundations of probability and statistical methods
- To impart probability concepts and statistical methods in various application Engineering

Course Outcomes:

Upon successful completion of this course, the student should be able to

1. Classify the concepts of data science and its importance
2. Interprete association of characteristics and through correlation and regression tools
3. Apply discrete and continuous probability distributions
4. Identify and apply appropriate probability distributions to real world problems
5. Design the components of a classical hypothesis test
6. Infer the statistical inferential methods based on small and large sampling tests

UNIT– I: Descriptive statistics and methods for datascience:

Data science–Statistics Introduction–Population vs Sample –Collection of data –primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability – Skewness Kurtosis.

UNIT–II: Correlation and Regression:

Correlation – Correlation coefficient–Rank correlation.
Linear Regression:Straight line–Multiple Linear Regression-Regressioncoefficientsand properties – Curvilinear Regression: Parabola – Exponential – Power curves.

UNIT–III: Probability and Distributions:

Probability–Conditional probability and Baye's theorem–Random variables–Discrete and Continuous random variables – Distribution functions – Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions

UNIT–IV: Sampling Theory:

Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only) – Point and Interval estimations – Maximum error of estimate–Central limit theorem (without proof) – Estimation using t, $\chi 2$ and F-distributions.

U N I T– V:Tests of Hypothesis:

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type I I errors – Level of significance – One tail and two-tail tests – Test of significance for large samples and Small Samples:Single and difference means – Single and two proportions–Student's t- test, F-test, $\chi 2$ -test.

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TEXT BOOKS:

1. Miller and Freund's, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

REFERENCE BOOKS:

1. Shron L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
2. Jayl. Devore, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. Sheldon M. Ross, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. Johannes Ledolter and Robert V. Hogg, Applied statistics for Engineers and physical scientists, 3rd Edition, Pearson, 2010

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Minutes of Meeting

Resolutions:

At the outset, the Principal of D N R College of Engg. &Tech. expressed his gratitude to the University Nominee and other Members of BOS and handed over the session to the Chairman of BOS.

Welcome speech by the Chairperson.

Resolution:

The BOS chairman welcomed the Members of the Meeting. He briefed them about structure and pattern of the course. The chairman of BOS placed the agenda for the deliberation of the members. The following deliberations were made as per the items of circular agenda.

1. **Approval of the proposed DR- 24 MBA Regulations (Annexure – I)**

   Suggestion: Discussions made on the DR- 24 MBA Regulations to implement.

   Resolution: BOS members resolved to implement the proposed DR- 24 MBA regulations from the AY: 2024-2025 onwards.

2. **Approve the DR- 24 II B.Tech Management Subjects (Annexure – II)**

   Suggestion: Discussion held on B.Tech Management Subjects such as, MEFA, UHV. Prof. B. V. R. Naidu Subject expert, proposed to implement syllabus deviation in II B.Tech.

   Resolution: Resolved to modify the syllabus from 15% to 20% from next academic year onwards.

3. **Ratification of Course Objectives and Course Outcomes of II B.Tech Management Subjects. (Annexure – III)**

   Suggestion: Discussion was held on the course objectives as well as course outcomes of the subjects.

   Resolution: Resolved the course objectives and course outcomes of II B.Tech Management subjects

4. **Approve the DR- 24 II B.Tech Model Papers (Annexure – IV)**

   Suggestion: Discussions made on the B.Tech Model Papers to implement.

   Resolution: Unanimously resolved to implement the existing model papers.

5. **No further item to discuss proposed by BOS Members**

   The chairman of BOS concluded the meeting by summarizing all the agenda points and resolutions.

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II Year II Semester

L	T	P	C
2	0	0	2

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

UNIT-I Managerial Economics

Introduction – Nature, meaning, significance, functions, and advantages. Demand- Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT-II Production and Cost Analysis

Introduction– Nature, meaning, significance, functions and advantages. Production Function–Least-cost combination–Short run and long run Production Function-Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT-III Business Organizations and Markets

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies-PublicSectorEnterprises.TypesofMarkets-PerfectandImperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT-IV Capital Budgeting

Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting–Features, Proposals, Methods and Evaluation. Projects–Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT-V Financial Accounting and Analysis

Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney & Maheswari: Managerial Economics, SChand.
2. Aryasri: Business Economics and Financial Analysis, 4/e,MGH.

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G.Nellisand David Parker: Principles of Business Economics, Pearson,2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

Online Learning Resources:

https://www.slideshare.net/123ps/managerial-economics-ppt
https://www.slideshare.net/rossanz/production-and-cost-45827016
https://www.slideshare.net/darkyla/business-organizations-19917607
https://www.slideshare.net/balarajbl/market-and-classification-of-market
https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
https://www.slideshare.net/ashu1983/financial-accounting

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