Board of Studies
file for the
Academic Year 2025-26

ELECTRONICS & COMMUNICATION ENGINEERING

For

B.Tech FOUR YEARS DEGREE PROGRAM
(DR24 Applicable for batches admitted from 2024-25)
&
M.Tech TWO YEARS DEGREE PROGRAM
(DR24 Applicable for batches admitted from 2024-25)

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada)
(Accredited with A^{++} Grade by NAA C & 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

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Ph: 08816-221238 Email: dnrcet@gmail.com Website: https://dnrcet.org
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Bhim avaram,
Dt: 24/03/2025.

CIRCULAR

This is to inform all the BoS members of the ECE department that the 2nd Board of Studies (BOS) meeting for the A.Y: 2025-26 will be held online on Wednesday, 26/03/2025, at 10:30 AM in the R & D Lab. All the BOS members are invited to attend the meeting, and the link for the online meeting will be shared through mail ID.

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.

Head of the Department & BOS Chairman

Copy To:

1. Members of the BOS
2. Principal
3. Dean (Academics)
4. Office (for File)

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Description	Designation in Committee	Name(s) of the Member(s)/Nominee(s)
Head of the Department concerned	**Chairperson**	Dr. K. Venu Gopal
One expert is to be nominated by the Vice-Chancellor from a panel of six recommended by the Autonomous College Principal	**Member (University Nominee)**	Dr. B. T Krishna, Professor, ECE Department, University College of Engineering, Kakinada, AP-533003. e-mail: tkbattula@jntucek.ac.in Mobile: 9502770755.
Two subject experts from outside the parent University are to be nominated by the Academic Council.	**Member (Subject experts from outside the parent University)**	Dr. N. Udaya Kumar, Professor & HOD, ECE Dept, SRKR Engineering. College (Autonomous), Bhimavaram-534202, e-mail: nuk@srkrec.ac.in Mobile: 9440354093.
	Member (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.
One representative from the industry/corporate sector/allied areas to be nominated by the principal	**Member (Industrial Expert)**	Mr. Sriramulu Govada, Design. Technical Officer 'A', DRDO, Visakhapatnam, e-mail: sriramgovada@gmail.com Mobile: 9492126360.
One member of the College alumni to be nominated by the principal	**Member (College alumni)**	Mrs. I. Pavani, 2016-20 Batch, Roll No.169P1A0416, e-mail: pavaniindukuri123@gmail.com, Mobile No: 63039 84842.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Experts from outside the Autonomous College, whenever special courses of studies are to be formulated, are to be nominated by the principal	**Member** **(Experts from outside the Autonomous College)**	NA
All faculty members of the Department	**Members**	Dr. Nekkanti Venkata Rao Dr A.Purna Ramesh Dr.S. Ravi chandra Mr. Kopalli Venkanna Naidu Mr. Kurma Sekhar Babu Mr. S Satish Kumar Mrs. N Mary Leena 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

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Bhim avaram,
Dt: 24/03/2025.

To

Dr. N. Udaya Kumar,
Professor & HOD, ECE Department,
SRKR Engineering College (Autonomous),
Bhim avaram, AP-534202.

Respected sir,

Sub: DNR College of Engineering & Technology, ECE Dept-Board of Studies Meeting-Reg.

We take the privilege of inviting you to the 2nd Board of Studies (BoS) Meeting of the ECE Department, DNR College of Engineering & Technology(9P) as a Subject Expert from outside the parent university. It is proposed to discuss and finalize the following agenda points for the A.Y. 2025- 26.

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 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.**

In this regard, you are requested to attend the online meeting scheduled to be held on 26/03/2025, Wednesday at 10:30 AM in the R & D Lab, ECE Department. The link will be shared through mail.

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

Yours Sincerely,

K Venu Gopal

(Dr. K. Venu Gopal),

HOD and Chairman BoS.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Bhim avaram,
Dt: 24/03/2025.

To
Dr. P. Srinivasa Rao,
Assoc. Professor, ECE Department,
St. Anna's College of Engineering & Technology (Autonomous),
Chirala, AP – 523187.

Respected sir,

Sub: DNR College of Engineering & Technology, ECE Dept-Board of Studies Meeting-Reg.

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Yours Sincerely,

(Dr. K. Venu Gopal),

HOD and Chairman BoS.

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Bhim avaram,
Dt: 24/03/2025.

To

Mr. Sriramulu Govada,
Design. Technical Officer 'A',
DRDO, Visakhapatnam,
AP-530027.

Dear sir,

Sub: DNR College of Engineering & Technology, ECE Dept-Board of Studies Meeting-Reg.

We take the privilege of inviting you to the 2nd Board of Studies (BoS) Meeting of the ECE Department, DNR College of Engineering & Technology(9P) as an Industrial Expert from outside the parent university. It is proposed to discuss and finalize the following agenda points for the A.Y. 2025- 26.

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3. **To discuss and finalize the proposed II B. Tech. I & II Semester Course Structure and Syllabus of DR-24 Regulations.**
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Yours Sincerely,

(Dr. K. Venu Gopal)

HOD and Chairman BoS.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Bhim avaram,
Dt: 24/03/2025.

To

Dr. B. T Krishna,
Professor, ECE Department,
University College of Engineering,
Kakinada, AP-533003.

Dear sir,

Sub: DNR College of Engineering & Technology, ECE Dept-Board of Studies Meeting-Reg.

We take the privilege of inviting you to the 2nd Board of Studies (BoS) Meeting of the ECE Department, DNR College of Engineering & Technology(9P) as a University Nominee from the parent university. It is proposed to discuss and finalize the following agenda points for the A.Y. 2025- 26.

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

Yours Sincerely,

(Dr. K. Venu Gopal)

HOD and Chairman BoS.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Bhim avaram,
Dt: 24/03/2025.

To

Mrs. I. Pavani,
2016-20 Batch,
Roll No.169P1A0416,
Bhim avaram,
AP-534202.

Dear Pavani,

Sub: DNR College of Engineering & Technology, ECE Dept-Board of Studies Meeting-Reg.

We take the privilege of inviting you to the 2nd Board of Studies (BoS) Meeting of the ECE Department, DNR College of Engineering & Technology(9P) as a college alumnus. It is proposed to discuss and finalize the following agenda points for the A.Y. 2025- 26.

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

Yours Sincerely,

(Dr. K. Venu Gopal)

HOD and Chairman BoS.

Gmail

ECE DEPARTMENT ECE <dnrcetece@gmail.com>

DNRCET BOS MEETING

1 message

ELECTRONICS <dnrcetece@gmail.com> Tue, Mar 25, 2025 at 3:17 PM
To: tkbattula@jntucek.ac.in

BOS MEETING INVITATION

--
With Warm regards
HOD
Dept. of ECE
Contact No: 9177334445
DNRCET
Bhimavaram-534202
W.G.Dist.,
A.P.

Dr.B.T.Krishna.pdf
559K

Gmail

ECE DEPARTMENT ECE <dnrcetece@gmail.com>

DNRCET ECE BOS

1 message

ELECTRONICS <dnrcetece@gmail.com> Tue, Mar 25, 2025 at 3:26 PM
To: pavaniindukuri123@gmail.com

Greetings from DNRCET,BHIMAVARAM :
Respected sir ,
we are sending an invitation for the ECE Department BOS meeting which will be held on 26.03.2025 please find the invitation attached through this mail.

--
With Warm regards
HOD
Dept. of ECE
Contact No: 9177334445
DNRCET
Bhimavaram-534202
W.G.Dist.,
A.P.

i pavani.pdf
603K

Gmail **ECE DEPARTMENT ECE <dnrcetece@gmail.com>**

DNRCET ECE BOS

1 message

ELECTRONICS <dnrcetece@gmail.com> Tue, Mar 25, 2025 at 3:26 PM
To: Srinivas Rao <psraoece@gmail.com>

Greetings from DNRCET,BHIMAVARAM :
Respected sir ,
we are sending an invitation for the ECE Department BOS meeting which will be held on 26.03.2025 please find the invitation attached through this mail.

--
With Warm regards
HOD
Dept. of ECE
Contact No: 9177334445
DNRCET
Bhimavaram-534202
W.G.Dist.,
A.P.

Dr.P.Srinivas.pdf
794K

Gmail

ECE DEPARTMENT ECE <dnrcetece@gmail.com>

DNRCET ECE BOS

1 message

ELECTRONICS <dnrcetece@gmail.com> Tue, Mar 25, 2025 at 3:27 PM
To: Sriram Govada <sriramgovada@gmail.com>

Greetings from DNRCET,BHIMAVARAM :
Respected sir ,
we are sending an invitation for the ECE Department BOS meeting which will be held on 26.03.2025 please find the invitation attached through this mail.

--
With Warm regards
HOD
Dept. of ECE
Contact No: 9177334445
DNRCET
Bhimavaram-534202
W.G.Dist.,
A.P.

sriram.pdf
525K

Gmail

ECE DEPARTMENT ECE <dnrcetece@gmail.com>

DNRCET ECE BOS

1 message

ELECTRONICS <dnrcetece@gmail.com> Tue, Mar 25, 2025 at 3:24 PM
To: nuk@srkrec.ac.in

Greetings from DNRCET,BHIMAVARAM :
Respected sir ,
we are sending an invitation for the ECE Department BOS meeting which will be held on 26.03.2025 please find the invitation attached through this mail.

--
With Warm regards
HOD
Dept. of ECE
Contact No: 9177334445
DNRCET
Bhimavaram-534202
W.G.Dist.,
A.P.

DrN.UDAY KUMAR.pdf
717K

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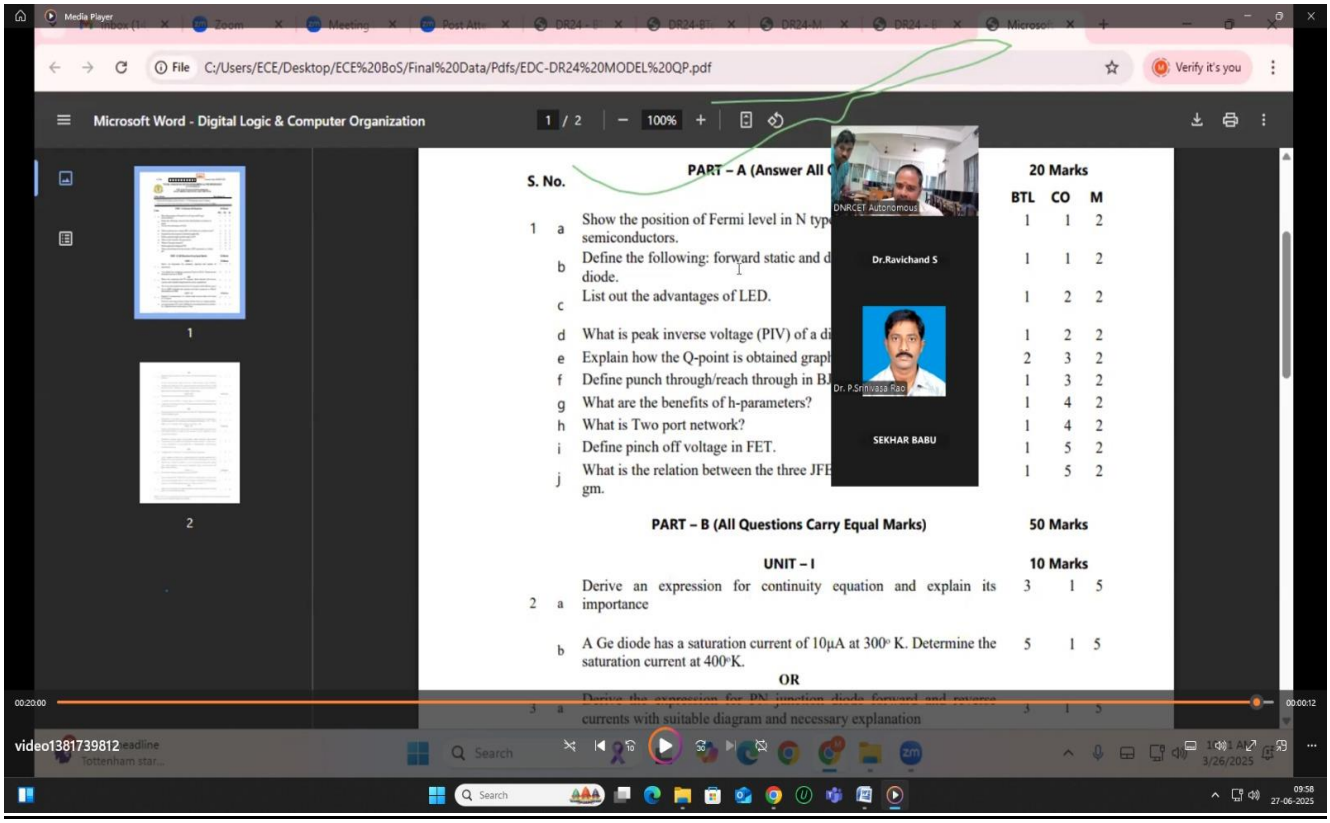

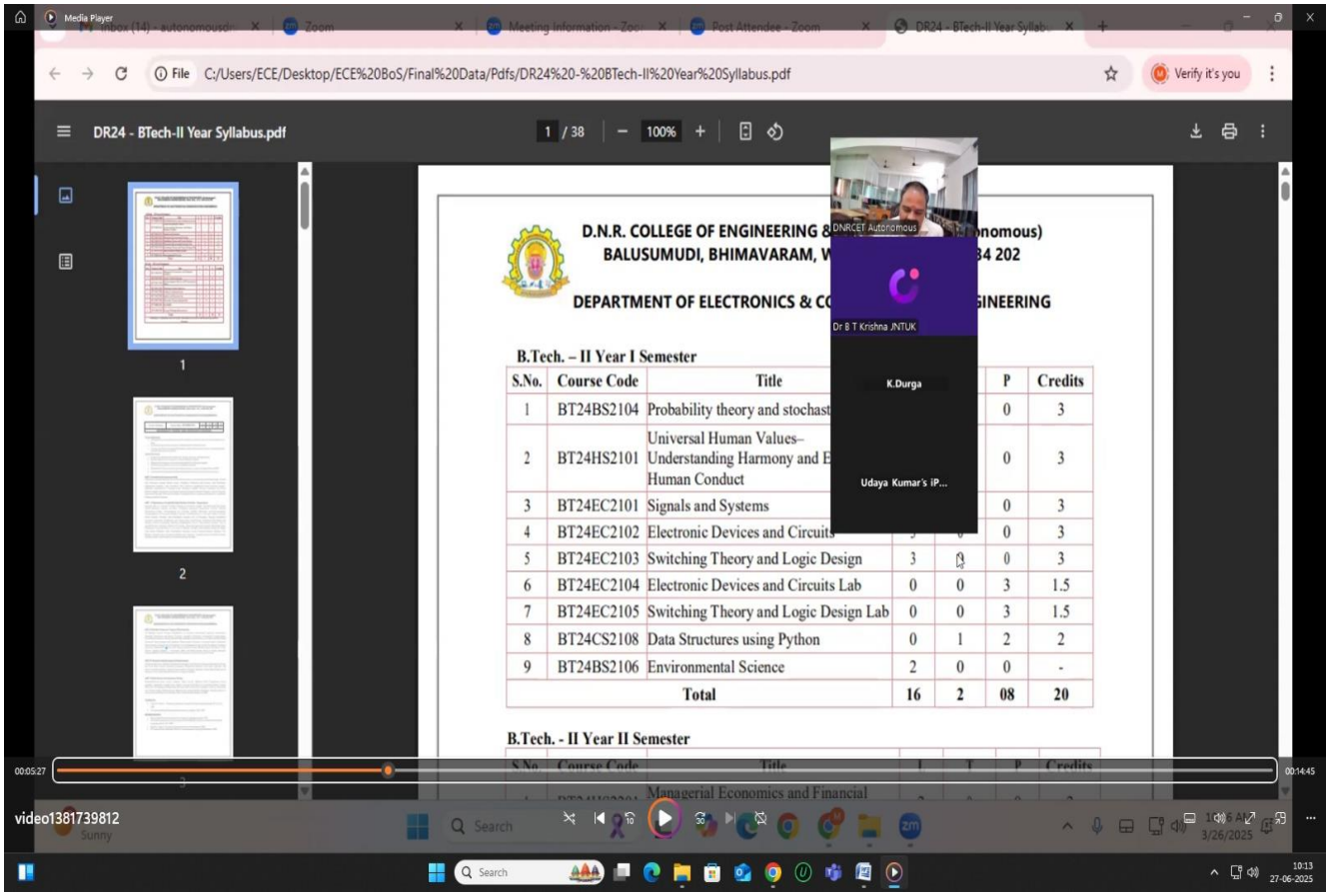

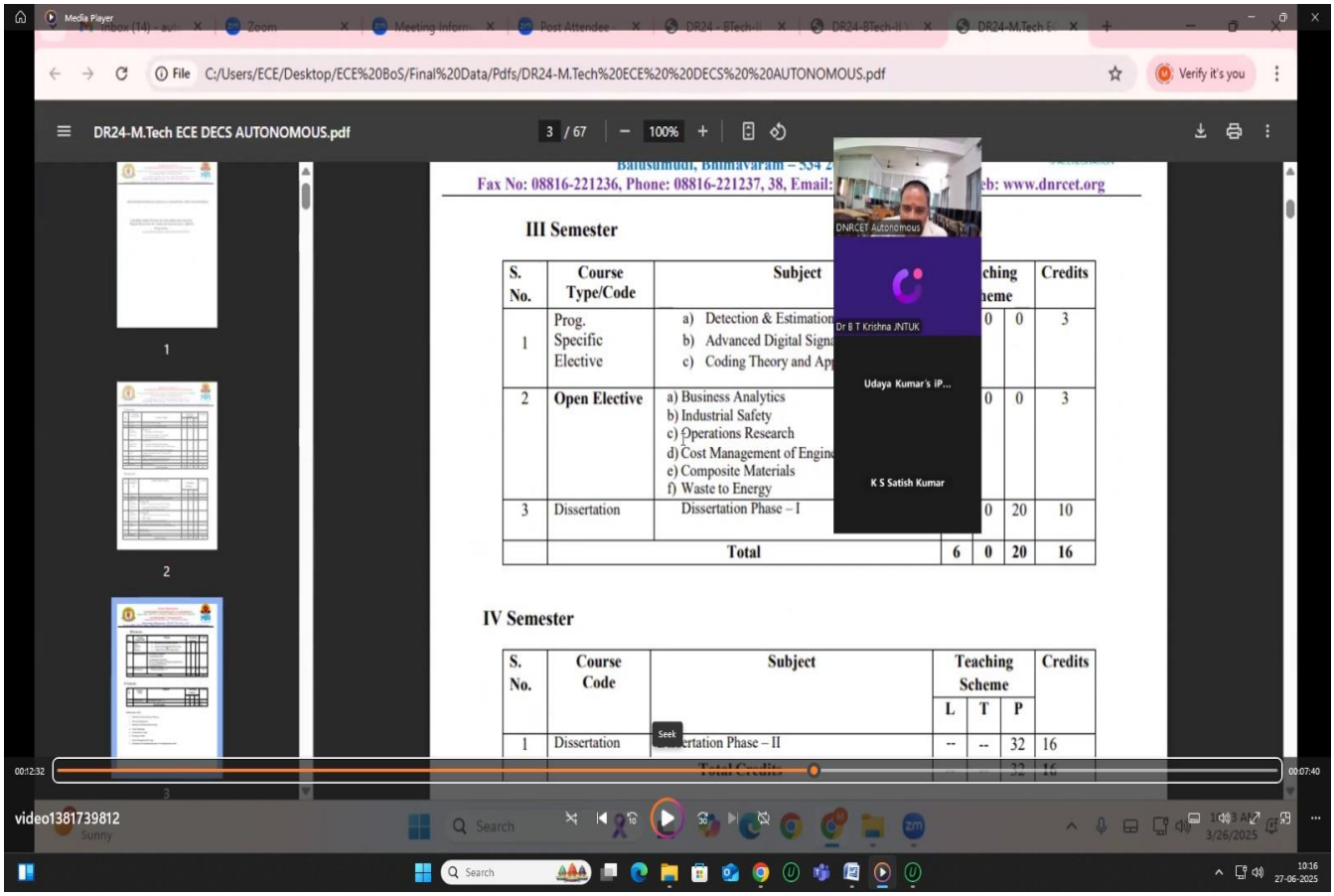
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Dr B T Krishna JNTUK
Udaya Kumar's iP...
K S Satish Kumar
III Semester
S. No.
Course Type/Code
Subject
Credits
1
Prog. Specific Elective
a) Detection & Estimation
b) Advanced Digital Signa
c) Coding Theory and Ap
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2
Open Elective
a) Business Analytics
b) Industrial Safety
c) Operations Research
d) Cost Management of Engin
e) Composite Materials
f) Waste to Energy
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Dissertation
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IV Semester
S. No.
Course Code
Subject
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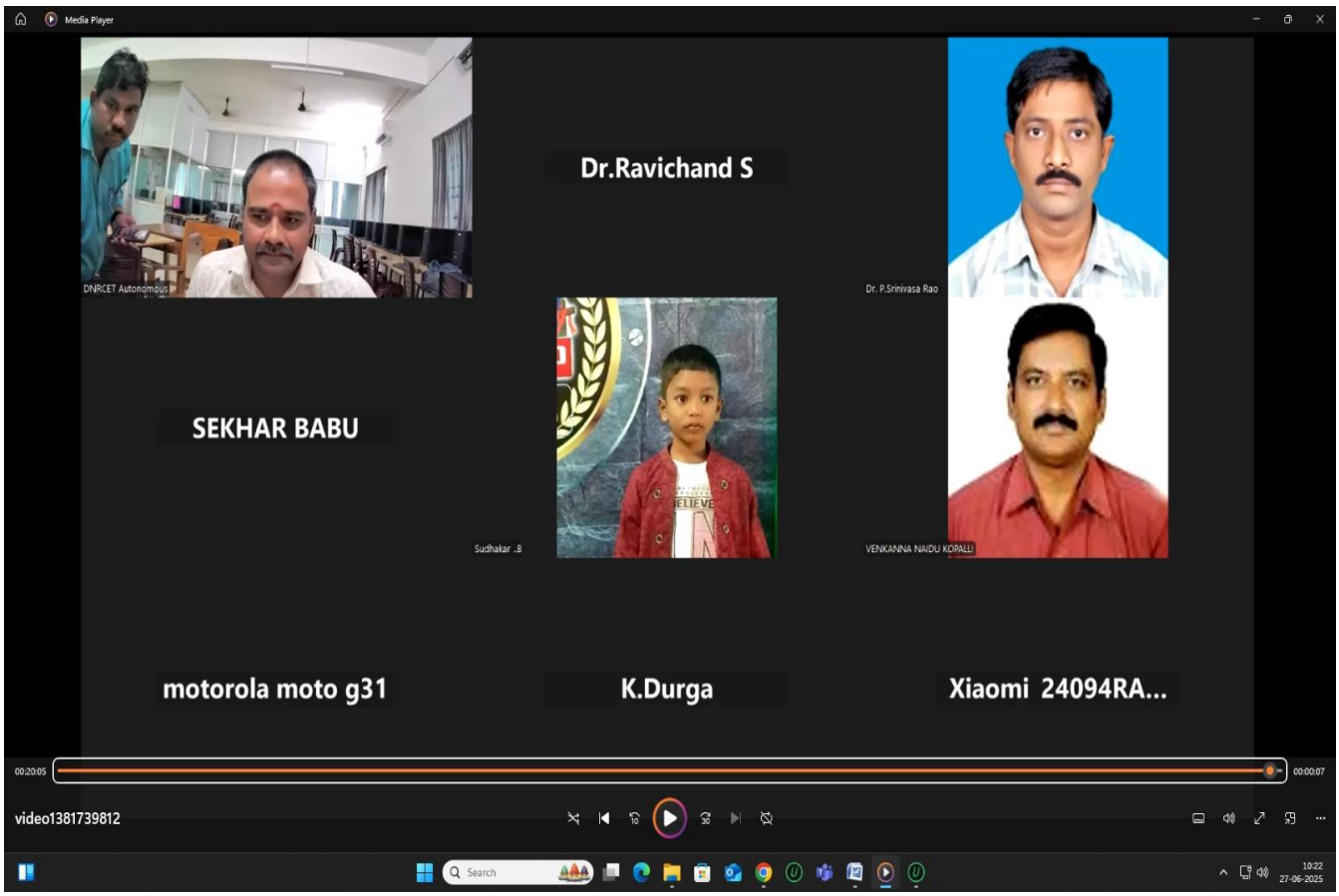
Media Player
DNRCET Autonomous
Dr.Ravichand S
Dr. P.Srinivasa Rao
SEKHAR BABU
Sudhakar ..B
VENKANNA NAIDU KOPALLI
motorola moto g31
K.Durga
Xiaomi 24094RA...
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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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

DR24

ENGINEERING CURRICULUM

B.Tech. Four Years Degree Program

(DR24 II B.Tech. I & II Semester Syllabus)

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

Accredited with A++ Grade by NAAC & Accredited by NBA (B.Tech.–CSE, ECE & EEE)

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

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D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)
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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech. – II Year I Semester

S.No.	Course Code	Title	L	T	P	Credits
1	BT24BS2104	Probability theory and stochastic process	3	0	0	3
2	BT24HS2101	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	BT24EC2101	Signals and Systems	3	0	0	3
4	BT24EC2102	Electronic Devices and Circuits	3	0	0	3
5	BT24EC2103	Switching Theory and Logic Design	3	0	0	3
6	BT24EC2104	Electronic Devices and Circuits Lab	0	0	3	1.5
7	BT24EC2105	Switching Theory and Logic Design Lab	0	0	3	1.5
8	BT24CS2108	Data Structures using Python	0	1	2	2
9	BT24BS2106	Environmental Science	2	0	0	-
Total			**16**	**2**	**08**	**20**

B.Tech. - II Year II Semester

S.No.	Course Code	Title	L	T	P	Credits
1	BT24HS2201	Managerial Economics and Financial Analysis	2	0	0	2
2	BT24EC2201	Linear Control Systems	3	0	0	3
3	BT24EC2202	Electromagnetic Waves and Transmission Lines	3	0	0	3
4	BT24EC2203	Electronic Circuit Analysis	3	0	0	3
5	BT24EC2204	Analog Communications	3	0	0	3
6	BT24EC2205	Signals and Systems Lab	0	0	3	1.5
7	BT24EC2206	Electronic Circuit Analysis lab	0	0	3	1.5
8	BT24BS2205	Soft Skills	0	1	2	2
9	BT24ME2207	Design Thinking &Innovation	1	0	2	2
Total			**15**	**1**	**10**	**21**
Mandatory Community Service Project Internship of 08weeks duration during summer Vacation						

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-I Semester	Course Code: BT24BS2104	L	T	P	C
		3	0	0	3
PROBABILITY THEORY AND STOCHASTIC PROCESS					

Course Objectives:

- This gives basic understanding of random variables and operations that can be performed on them.
- To know the Spectral and temporal characteristics of Random Process.
- To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics.

Course Outcomes:

CO1: Analyze key distributions like Binomial, Poisson, Gaussian, and Exponential.
CO2: Perform operations on single and multiple Random variables.
CO3: Determine the Spectral and temporal characteristics of Random Signals.
CO4: Compute autocorrelation and cross-correlation functions.
CO5: Characterize LTI systems driven by stationary random process by using ACFs and PSDs.
CO6: Understand the concepts of Noise and Information theory in Communication systems.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	3	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-
CO6	-	3	-	-	-	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	2	-
CO2	-	2
CO3	2	-
CO4	2	-
CO5	-	2
CO6	-	2

UNIT-I Probability & Random Variable:
Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces,

Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events, Random Variable-Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

UNIT - II Operations on Single & Multiple Random Variables – Expectations:
Expected Value o a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable. Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density–Point Conditioning, Conditional Distribution and Density– Interval conditioning, Statistical Independence. Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables

UNIT-III Random Processes–Temporal Characteristics:
The Random Process Concept, Classification of Processes, Deterministic and Non deterministic Processes, Distribution and Density Functions, concept of Stationary and Statistical Independence. First-Order Stationary Processes, Second Order and Wide-Sense Stationary, (N-Order) and Strict-Sense Stationary, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

UNIT-IV Random Processes–Spectral Characteristics:
The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

UNIT-V Noise Sources & Information Theory:
Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Information rate, Source coding: Huffman coding, Shannon Fan coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR.

TEXTBOOKS:

- Peloton Z. Peebles - Probability, Random Variables & Random Signal Principles, 4th Ed, TMH, 2001.
- Taub and Schilling-Principles of Communication systems, TMH, 2008

REFERENCEBOOKS:

- Bruce Hajck-Random Processes for Engineers, Cambridge unipress, 2015.
- Athanasius Papoulis and S. Unni krishna Pillai-Probability, Random Variables and Stochastic processes, 4th Ed., PHI, 2002.
- B.P.Lathi- Signals, Systems & Communications, B.S.Publications, 2003.
- S.P Eugene Xavier-Statistical Theory of Communication, New Age Publications, 2003.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-I Semester	Course Code: BT24HS2101	L	T	P	C
		2	1	0	3
UNIVERSAL HUMAN VALUES–UNDERSTANDING HARMONYAND 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 there 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 behavior and mutually enriching interaction with Nature.

Course Outcomes:

CO1: Define the terms like Natural Acceptance, Happiness and Prosperity.
CO2: Identify one's self and one's surroundings (family, society nature).
CO3: Apply what they have learnt to their own self in different day-to-day settings in real life.
CO4: Relate human values with human relationship and human society.
CO5: Justify the need for universal human values and harmonious existence.
CO6: Develop as socially and ecologically responsible engineers.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	3	3	-	2	-	3
CO2	-	-	-	-	-	-	-	3	2	2	-	3
CO3	-	-	-	-	-	-	-	3	2	-	-	2
CO4	-	-	-	-	-	-	3	3	2	2	-	3
CO5	-	-	-	-	-	-	3	3	-	-	-	3
CO6	-	-	-	-	-	3	3	2	2	-	-	2

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

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
Lecture 4: 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 this lf 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
Lecture12: Programmed 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

Lecture16: Other Feelings Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfill Human Goal

UNIT IV Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)
Lecture19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature
Tutorial10: 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

Tutorial11: 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
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

UNIT III – Harmony in the Family and Society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfill Human Goal

UNIT IV – Harmony in the Nature (Existence)
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence

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:
Text book and Teachers Manual
The Text book

- 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

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

- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- The Story of Stuff (Book).The Story of My Experiments with Truth - by Mohandas Karam chand Gandhi Small is Beautiful - E. F Schumacher. Slow is Beautiful - Cecile Andrews
- Economy of Permanence - J C Kumarappa Bharat Mein Angreji Raj – Pandit Sunder lal
- Rediscovering India - by Dharampal Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
- India Wins Freedom - Maulana Abdul Kalam Azad Vivekananda - Romain Rolland (English)
- 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:

- https://fdp-si.aicte-india.org/UHV-%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
- https://fdp-si.aicte-india.org/UHV-I%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-

Harmony%20in%20the%20Human%20Being.pdf

- https://fdp-si.aicte-india.org/UHV-I%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
- https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
- https://fdp-si.aicte-india.org/UHV-%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
- 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
- https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
- https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385 https://onlinecourses. swayam2.ac.in/aic22_ge23/preview

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-I Semester	Course Code: BT24EC2101	L	T	P	C
		3	0	0	3
SIGNALS AND SYSTEMS					

Course Objectives:

- To study about signals and systems.
- To analyze the spectral characteristics of signal using Fourier series and Fourier transforms.
- To understand the characteristics of systems.
- To introduce the concept of sampling process
- To know various transform techniques to analyze the signals and systems.

Course Outcomes:

CO1: Differentiate the various classifications of signals and systems
CO2: Analyze the frequency domain representation of signals using Fourier concepts
CO3: Classify the systems based on their properties and determine the response of LTI Systems.
CO4: Perform linear convolution and understand its implications on system output.
CO5: Know the sampling process and various types of sampling techniques.
CO6: Apply Laplace and z-transforms to analyze signals and Systems (continuous & discrete).

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	2	-	-	-	-	-	-	-
CO3	3	3	-	2	2	-	-	-	-	-	-	-
CO4	3	3	-	2	2	-	-	-	-	-	-	-
CO5	3	3	-	2	2	-	-	-	-	-	-	-
CO6	3	3	3	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	2	2
CO2	2	1
CO3	-	-
CO4	-	-
CO5	1	1
CO6	2	1

UNIT- I: INTRODUCTION:

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time- scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, orthogonality in complex functions. Related problems.

UNIT–II: FOURIER SERIES AND FOURIER TRANSFORM:

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform, Related problems.

UNIT-III: ANALYSIS OF LINEAR SYSTEMS:

Introduction, Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV)system ,Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT–IV: CORRELATION:

Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering. SAMPLING THEOREM: Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to Band Pass sampling, Related problems.

UNIT–V: LAPLACE TRANSFORMS:

Introduction, Concept of region of convergence (ROC) for Laplace transforms constraints on ROC for various classes of signals, Properties of L.T's, Inverse Laplace transform, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

Z–TRANSFORMS: Concept of Z-Transform of a discrete sequence. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z- transform, properties of Z-transforms. Distinction between Laplace, Fourier and Z transforms.

TEXT BOOKS:

- Signals, Systems & Communications- B.P.Lathi, BS Publications, 2003.
- Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H.Nawab, PHI, 2nd Edn, 1997
- Signals & Systems-Simon Haykin and VanVeen, Wiley, 2nd Edition, 2007

REFERENCE BOOKS:

- Principles of Linear Systems and Signals–BP Lathi, Oxford University Press, 2015
- Signals and Systems–TK Rawat, Oxford University press, 2011

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-I Semester	Course Code: BT24EC2102	L	T	P	C
		3	0	0	3
ELECTRONIC DEVICES AND CIRCUITS					

Course Objectives:

- To learn and understand the basic concepts of semiconductor physics.
- Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
- To learn and understand the application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
- Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics.
- To learn and understand the purpose of transistor biasing and its significance.
- Small signal equivalent circuit analysis of BJT and FET transistor amplifiers and compare different configurations.

Course Outcomes:

CO1: Apply the basic concepts of semiconductor physics.
CO2: Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
CO3: Analyze the construction, working principle of Semiconductor Devices and Diode Circuits.
CO4: Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.
CO5: Apply small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.
CO6: Understand the working of MOSFETs in digital circuits.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	2	1	-	-	-	3
CO2	3	1	1	-	-	-	2	1	-	-	-	3
CO3	3	1	-	1	-	-	2	1	-	-	-	3
CO4	3	1	-	-	-	-	2	1	-	-	-	3
CO5	3	1	-	-	-	-	2	1	-	-	-	3
CO6	3	1	1	-	-	-	2	1	-	-	-	3

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	1	-
CO2	2	-
CO3	2	-
CO4	2	-
CO5	2	-
CO6	2	-

UNIT-I: Review of Semiconductor Physics:

Mobility and Conductivity, Intrinsic and extrinsic semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.(Text book: 1)

Junction Diode Characteristics: energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in p-n junction Diode, Diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance. (Text book: 1)

UNIT-II: Special Semiconductor Devices:

Zener Diode, Breakdown mechanisms, Zener diode applications, Varactor Diode, LED, Photodiode, Tunnel Diode, UJT, PNPN Diode, SCR, Construction, operation and V-I characteristics. (Text book: 1)

Diode Circuits: The Diode as a circuit element, The Load-Line concept, The Piecewise Linear Diode model, Clipping (limiting) circuits, Clipping at Two Independent Levels, Peak Detector, Clamping circuits, Comparators, Sampling Gate, Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters, Inductor filter, Capacitor filter, π-section Filter, comparison of various filter circuits in terms of ripple factors. (Text book: 1, 2)

UNIT-III: Transistor Characteristics:

Junction transistor, transistor current components, transistor equation in CB configuration, transistor as an amplifier, and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values. (Text book: 1)

Transistor Biasing and Thermal Stabilization: Need for biasing, operating point, load line analysis, BJT biasing-methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in VBE, Ic, and β, Stability factors,(S,S',S''),Bias compensation, Thermal runaway, Thermal stability. (Text book: 1)

UNIT-IV: Small Signal Low Frequency Transistor Amplifier Models BJT:

Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers. (Text book: 1, 2)

UNIT-V: FET:

FET types, JFET operation, characteristics, small signal model of JFET. (Text book: 1)MOSFET: MOSFET Structure, Operation of MOSFET: operation in triode region, operation in saturation region, MOSFET as a variable resistor, derivation of V-I characteristics of MOSFET, Channel length

modulation, MOS trans conductance, MOS device models: MOS small signal model, PMOS Transistor, CMOS Technology, Comparison of Bipolar and MOS devices. (Text book: 3)CMOS amplifiers: General Considerations, Common Source Stage, Common Gate Stage, Source Follower, comparison of FET amplifiers. (Text book: 3)

Text Books:

- Millman's Electronic Devices and Circuits-J. Millman, C. C. Halkias and Satyabrata Jit, Mc-Graw Hill Education, 4th edition, 2015.
- Millman's Integrated Electronics-J. Millman, C. Halkias, and Ch. D. Parikh, Mc-Graw Hill Education, 2nd Edition, 2009.
- Fundamentals of Microelectronics-Behzad Razavi, Wiley, 3rd edition, 2021.

References:

- Basic Electronics-Principles and Applications, Chinmoy Saha, Arindam Halder, Debarati Ganguly, Cambridge University Press.
- Electronics devices & circuit theory-Robert L. Boylestad and Loui Nashelsky, Pearson, 11th edition, 2015.
- Electronic Devices and Circuits-David A. Bell, Oxford University Press, 5th edition, 2008.

Electronic Devices and Circuits-S.Salivahanan, N. Suresh Kumar, Mc-Graw Hill, 5th edition, 2022.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-I Semester	Course Code: BT24EC2103	L	T	P	C
		3	0	0	3
SWITCHING THEORY AND LOGIC DESIGN					

Course Objectives:

- To solve a typical number base conversion and analyze new error coding techniques.
- Theorems and functions of Boolean algebra and behavior of logic gates
- To optimize logic gates for digital circuits using various techniques.
- Boolean function simplification using Karnaugh maps and Quine-Mc Cluskey methods
- To understand concepts of combinational circuits.
- To develop advanced sequential circuits.

Course Outcomes:

CO1: Classify different number systems and apply to generate various codes.
CO2: Use the concept of Boolean algebra in minimization of switching functions.
CO3: Design different types of combinational logic circuits.
CO4: Apply knowledge of flip-flops in designing of Registers and Counters.
CO5: The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
CO6: Produce innovative designs by modifying the traditional design techniques.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	1	-	-	-	-
CO2	3	3	-	-	3	-	-	1	-	-	-	-
CO3	2	2	2	2	-	-	-	1	-	-	-	-
CO4	3	3	-	-	-	-	-	1	-	-	-	-
CO5	3	2	-	1	1	-	-	1	-	-	-	-
CO6	3	1	3	-		-	-	1	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	2	2
CO2	2	1
CO3	3	2
CO4	2	1
CO5	3	2
CO6	2	1

UNIT–I REVIEW OF NUMBER SYSTEMS & CODES:

Representation of numbers of different radix, conversation from one radix to another radix, r- 1's compliments and r's compliments of signed members. Gray code, 4 bit codes; BCD, Excess-3, 2421, 84-2-1 code etc. Error detection & correction codes: parity checking, even parity, odd parity, hamming code.

BOOLEAN THEOREMS AND LOGIC OPERATIONS:

Boolean theorems, principle of complementation & duality, De-Morgan theorems. Logic operations; Basic logic operations- NOT, OR, AND, Universal Logic operations, EX-OR, EX- NOR operations. Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations, Realization of three level logic circuits.

UNIT–II MINIMIZATIONTECHNIQUES:

Minimization and realization of switching functions using Boolean theorems, K-Map (up to 6 variables) and tabular method (Quine-Mccluskey method) with only four variables and single function.

COMBINATIONAL LOGIC CIRCUITS DESIGN:

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4- bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit and carry look-a- head adder circuit, Design code converts using Karnaugh method and draw the complete circuit diagrams.

UNIT–III COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI & LSI:

Design of encoder, decoder, multiplexer and de-multiplexers, Implementation of higher order circuits using lower order circuits. Realization of Boolean functions using decoders and multiplexers. Design of Priority encoder, 4-bit digital comparator and seven-segment decoder.

INTRODUCTION OF PLD's: PLDs: PROM, PAL, PLA -Basics structures, realization of Boolean functions, Programming table.

UNIT–IV SEQUENTIAL CIRCUITS-I:

Classification of sequential circuits (synchronous and asynchronous) , operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip- flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip- flop. Design of 5ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift, register Study the following relevant ICs and their relevant functions 7474, 7475, 7476, 7490, 7493, 74121.

UNIT–V SEQUENTIAL CIRCUITS-II:

Finite state machine; state diagrams, state tables, reduction of state tables. Analysis of clocked sequential circuits Mealy to Moore conversion and vice-versa. Realization of sequence generator, Design of Clocked Sequential Circuit to detect the given sequence (with overlapping or without overlapping)

TEXT BOOKS:

- Switching and finite automata theory Zvi. KOHAVI, Niraj. K. Jha 3rd Edition, Cambridge University Press, 2009
- Digital Design by M. Morris Mano, Michael DCiletti, 4th edition PHI publication, 2008
- Switching theory and logic design by Hilland Peterson, Mc-Graw Hill TMH edition, 2012.

REFERENCES:

- Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 2006
- Digital electronics by RS Sedha. S. Chand & company limited, 2010
- Switching Theory and Logic Design by A. Anand Kumar, PHI Learning pvt ltd, 2016.
- Digital logic applications and design by John M Yarbough, Cengage learning, 2006.
- TTL74-Series data book.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-I Semester	Course Code: BT24EC2104	L	T	P	C
		0	0	3	1.5
ELECTRONIC DEVICES AND CIRCUITS LAB					

Course Outcomes:

CO1: Analyze the characteristics of PN junction diodes in different applications.
CO2: Implement rectifier circuits (half-wave, full-wave, and bridge) with and without filters.
CO3: Experimentally determine the input and output characteristics of BJT and FET in different configurations.
CO5: Implement biasing circuits for BJTs and analyze their stability.
CO6: Demonstrate measurements of voltage, frequency and phase by using CRO.
CO6: Observe and analyze the frequency response of BJT and FET amplifiers.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	2	1	-	-	-	1
CO2	3	2	2	1	2	-	2	1	-	-	-	1
CO3	3	3	-	2	2	-	2	1	-	-	-	1
CO4	3	2	2	2	2	-	2	1	-	-	-	1
CO5	2	2	-	3	3	-	2	1	-	2	-	1
CO6	3	2	-	2	2	-	2	1	-	-	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	2	-
CO2	2	-
CO3	2	-
CO4	2	-
CO5	2	-
CO6	2	-

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Clipper circuit using diode
2. Clamping circuit using diode
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics (CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics(CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

Equipment required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multi-meters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-I Semester	Course Code: BT24EC2105	L	T	P	C
		0	0	3	1.5
SWITCHING THEORY AND LOGIC DESIGN LAB					

Course Outcomes:

CO1: Verify the truth tables of basic logic gates and Implement Boolean expressions using basic and universal gates.
CO2: Implement and analyze multiplexers and demultiplexers.
CO3: Verify the operation of Flip-Flops using logic gates and ICs.
CO4: Construct counters like synchronous, asynchronous, up/down counters, modulo counters.
CO5: Design and implement of universal shift register for different modes of operation.
CO6: Gain hands-on experience in designing and testing simple digital systems like comparators.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	1	-	-	-	-	-	-	-
CO2	-	-	2	-	2	-	-	-	-	-	-	-
CO3	2	2	3	2	2	-	-	-	-	-	-	-
CO4	3	2	3	2	2	-	-	-	-	-	-	-
CO5	3	-	3	-	2	-	-	-	-	-	-	-
CO6	1	2	3	-	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	1
CO2	-	1
CO3	2	2
CO4	2	2
CO5	1	2
CO6	2	2

TEXT BOOKS:

1. Automatic Control Systems 8th edition–by B.C. Kuo – Johnwiley and son's, 2003.
2. Control Systems Engineering – by I.J. Nagrath and M.Gopal, New Age International (P) Limited, Publishers, 2nd edition, 2007
3. Modern Control Engineering – by Katsuhiko Ogata – Pears on Publications, 5thedition, 2015.

REFERENCE BOOKS:

1. Control Systems by A. Nagoorkani, RBA publications, 3edition, 2017.
2. Control Systems by A. Anand kumar, PHI, 2Edition, 2014.

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Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	2	-
CO2	2	-
CO3	2	-
CO4	2	-
CO5	2	-
CO6	2	-

UNIT I - INTRODUCTION

Concepts of System, Control Systems: Open Loop and closed loop control systems and their differences. Different examples of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models, Differential equations, Impulse Response and transfer functions. Translational and Rotational mechanical systems

UNIT II – TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servo motor - AC Servo motor- Synchro-transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples –Block diagram algebra–Representation by Signal flow graph-Reduction using mason's gain formula.

TIME RESPONSE ANALYSIS

Standard test signals – Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems – Time domain specifications – Steady state response - Steady state errors and error constants.

UNIT III – STABILITY ANALYSIS INS-DOMAIN

The concept of stability–Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability 100

Root Locus Technique: The root locus concept-construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT IV FREQUENCY RESPONSE ANALYSIS

Introduction, Correlation between time and frequency response, Polar Plots, Bode Plots, Nyquist Stability Criterion.

UNIT V – CLASSICAL CONTROL DESIGN TECHNIQUES

Compensation techniques–Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers. State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-II Semester	Course Code: BT24EC2201	L	T	P	C
		3	0	0	3
LINEAR CONTROL SYSTEMS					

Course objectives:

- To introduce the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, and concepts of feedback
- To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis
- To develop the acquaintance in analyzing the system response in time-domain and frequency domain in terms of various performance indices
- To analyze the system in terms of absolute stability and relative stability by different approaches
- To design different control systems for different applications as per given specifications
- To introduce the concepts of state variable analysis, design and also the concepts of controllability and observability.

Course Outcomes:

CO1: This course introduces the concepts of feedback and its advantages to various control systems

CO2: The performance metrics to design the control system in time –domain and frequency domains are introduced.

CO3: Control systems for various applications can be designed using time-domain and frequency domain analysis.

CO4: Use Root Locus techniques to analyze system stability.

CO5: In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.

CO6: Implement lead, lag, and lead-lag compensators to improve system performance

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	1	-	-	1	-	2
CO2	3	3	-	-	-	-	1	-	-	1	-	2
CO3	3	3	3	-	-	-	1	-	-	1	-	2
CO4	2	2	3	2	-	-	1	-	-	1	-	2
CO5	3	2	2	2	-	-	1	-	-	1	-	2
CO6	3	2	3	2	2	-	1	-	-	1	-	2

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2. S.A.Siddiquiand A.S.Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G.Nellis and 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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Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

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,functionsandadvantages.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-Public Sector Enterprises. Types of Markets-Perfect and Imperfect 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, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-II Semester	Course Code: BT24HS2201	L	T	P	C
		2	0	0	2
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS					

Course Objectives:

- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

CO1: Define the concepts related to Managerial Economics, financial accounting and management.
CO2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets.
CO3: Apply the Concept of Production cost and revenues for effective Business decision.
CO4: Analyze how to invest their capital and maximize returns.

CO5: Evaluate the capital budgeting techniques.
CO6: Develop the accounting statements and evaluate the financial performance of business entity.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	2	-	-	-	2	3
CO2	-	-	-	-	-	-	2	-	-	-	2	3
CO3	-	-	-	-	-	-	3	-	-	-	2	2
CO4	-	-	-	-	-	-	2	-	-	-	2	3
CO5	-	-	-	3	3	-	2	2	-	-	3	3
CO6	-	-	-	3	3	-	2	2	-	-	3	2

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, hill slopes, etc.

Text books:

- Erach Bharucha, Text book of Environmental Studies for Undergraduate Courses, Universities Press (India) Private Limited, 2019.
- Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.
- S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.
- K. Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

Reference Books:

- Deeksha Dave and E. Sai Baba Reddy, Text book of Environmental Science, 2/e, Cengage Publications, 2012.
- M. Anji Reddy,"Text book of Environmental Sciences and Technology", BS Publication, 2014.
- J. P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.
- J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.
- G. R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.
- Gilbert M. Masters and Wendell. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc23_hs155/preview
- https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2-d84c-4773-8388-1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science+ +Part+3%3A+Pollution+and+Resources&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmental-science
- http://ecoursesonline.iasri.res.in/Courses/Environmental%20Science-I/Data%20Files/pdf/lec07.pdf

https://www.youtube.com/watch?v=5QxxaVfgQ3k

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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 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 ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grass land ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Bio diversity and Its Conservation: Introduction and 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 bio diversity–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 landslides.

UNIT–IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy –Water conservation, rain water harvesting, water shed 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 – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION 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:

CO1: Grasp multi disciplinary nature of environmental studies and various renewable and non-renewable resources.
CO2: Understand flow and bio-geo-chemical cycles and ecological pyramids.
CO3: Understand various causes of pollution and solid waste management and related preventive measures.
CO4: Understand the rain water harvesting, water shed management, ozone layer depletion and waste land reclamation.
CO5: Illustrate the causes of population explosion, value education and welfare programmes.
CO6: Study the impact of population growth on natural resources and the environment.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	3	-	-	-	-	1
CO2	2	3	2	-	-	-	2	-	-	-	-	1
CO3	2	2	1	-	-	-	1	-	-	-	-	1
CO4	2	1	2	-	-	-	1	-	-	-	-	1
CO5	3	2	2	-	-	-	1	-	-	-	-	1
CO6	2	2	2	-	-	-	1	-	-	-	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

List of Experiments:

1. Write a Python program for class, Flower, that has three instance variables of type str, int, and float that respectively represent the name of the flower, its number of petals, and its price. Your class must include a construct or method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type.
2. Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area () and perimeter ().Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area ( ) and perimeter ( ) methods.
3. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter
4. Write a python program to implement Method Over loading and Method Overriding.
5. Write a Python program to illustrate the following comprehensions: a) List Comprehensions b) Dictionary Comprehensions c) Set Comprehensions d) Generator Comprehensions
6. Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list. Example: Original list: [1,2,3,4,5,6,7,8,9]
7. Combinations of 2 distinct objects : [1,2][1,3][1,4][1,5][7,8][7,9] [8,9].
8. Write a program for Linear Search and Binary search.
9. Write a program to implement Bubble Sort and Selection Sort.
10. Write a program to implement Merge sort and Quick sort.
11. Write a program to implement Stacks and Queues.
12. Write a program to implement Singly Linked List.
13. Write a program to implement Doubly Linked list.
14. Write a program to implement Binary Search Tree.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-I Semester	Course Code: BT24CS2108	L	T	P	C
		0	1	2	2
DATA STRUCTURES USING PYTHON					

Course Outcomes:

CO1: Understand built-in Python data structures like lists, tuples, sets, and dictionaries.
CO2: Implement basic array and string operations.
CO3: Implement Singly Linked Lists, Doubly Linked Lists, and Circular Linked Lists.
CO4: Develop skills in data manipulation, list comprehension, dictionary comprehension, and set comprehension for efficient code writing and problem solving.
CO5: Learn how to implement and compare search and sort algorithms, including both linear and binary search, as well as sorting algorithms like bubble sort, selection sort, and quick sort, and analyze their efficiency.
CO6: Learn how to design and implement operations like insertion, deletion, traversal, and searching in these data structures to handle real-world data storage and retrieval needs.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	2	-	-	2	2	1	3
CO2	3	3	3	3	3	2	-	-	2	2	1	3
CO3	3	3	3	3	3	2	-	-	2	2	1	3
CO4	3	3	3	3	3	2	-	-	2	2	1	3
CO5	3	3	3	3	3	2	-	-	2	2	1	3
CO6	3	3	3	3	3	2	-	-	2	2	1	3

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	3	3
CO2	3	3
CO3	3	3
CO4	3	3
CO5	3	3
CO6	-	-

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Verification of truth tables of the following Logic gates.
   Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR
2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.
3. Verification of functional table of 3 to 8-line Decoder/De-multiplexer.
4. 4-Variable logic function verification using 8 to1 multiplexer.
5. Design full adder circuit and verify its functional table.
6. Verification of functional tables of
   (i) JK Edge triggered Flip–Flop (ii) JK Master Slave Flip–Flop (iii) D Flip-Flop
7. Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output.
8. Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output
9. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
10. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip- Flops and Test It with a low frequency clock and sketch the output waveforms.
11. Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.
12. (a)Draw the circuit diagram of a single bit comparator and test the output
    (b) Construct 7-Segment Display Circuit Using Decoder and 7-Segment LED and test it.

Additional Experiments:

1. Design BCD Adder Circuit and Test the Same using Relevant IC.
2. Design Excess-3 to9-Complement convertor using only four Full Adders and test the Circuit.
3. Design an Experimental model to demonstrate the operation of 74154 De-Multiplexer using LEDs for outputs.
4. Design of any combinational circuit using Hardware Description Language.
5. Design of any sequential circuit using Hardware Description Language.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-II Semester	Course Code: BT24EC2202	L	T	P	C
		3	0	0	3
ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES					

Course Objectives:

The main objectives of this course are to:

- Understand the fundamentals of electric fields, coulomb's law and gauss law
- Familiar with of Biot-Savart Law, Ampere's Circuital Law and Maxwell equations
- Aware of electromagnetic wave propagation in dielectric and conducting media
- Study the equivalent circuit of transmission lines and parameters of the transmission lines
- Learn the working of smith chart and its usage in the calculation of transmission line parameters

Course Outcomes:

After learning the course, the student will be able to:

CO1: Determine electric field intensity using coulomb's law and Gauss law.
CO2: Determine magnetic field intensity using Biot-Savarts Law and Ampere's Circuital Law.
CO3: Analyze the electromagnetic wave propagation in dielectric and conducting media.
CO4: Analyze the different ways of electromagnetic wave incidences at interface of two different medias.
CO5: Examine the primary and secondary constants of different types of transmission lines.
CO6: Derive the expressions for input impedance, reflection coefficient, and VSWR of transmission lines and calculate these parameters using smith chart.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	2	-	-	-	-	-	-	-	2
CO2	2	3	1	1	-	-	-	-	-	-	-	2
CO3	2	3	1	2	-	-	-	-	-	-	-	2
CO4	3	3	1	2	-	-	-	-	-	-	-	2
CO5	3	3	2	2	-	-	-	-	-	-	-	2
CO6	2	3	1	2	-	-	-	-	-	-	-	2

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	2
CO6	2	1

UNIT I:

Review of Co-ordinate Systems, Electrostatics: Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

UNIT II:

Magneto statics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface, Illustrative Problems.

UNITIII:

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, loss less dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types, Illustrative Problems. Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem, Illustrative Problems.

UNIT IV:

Transmission Lines - I : Types, Parameters, T & π Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Loss less lines, distortion less lines, Illustrative Problems.

UNIT V:

Transmission Lines–II: Input Impedance Relations, Reflection Coefficient, VSWR, Average Power, Shorted Lines, Open Circuited Lines, and Matched Lines, Low loss radio frequency and UHF Transmission lines, UHF Lines as Circuit Elements, Smith Chart – Construction and Applications, Quarter wave transformer, Single Stub Matching, Illustrative Problems.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O.Sadiku, Oxford University Press, 7th edition, 2018.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2008.

REFERENCE BOOK:

1. Engineering Electro magnetics – William H. Hayt, John A.Buck, Jaleel M. Akhtar, TMH, 9th edition, 2020.
2. Electromagnetic Field Theory and Transmission Lines– G.S.N.Raju, Pearson Education 2006
3. Electromagnetic Field Theory and Transmission Lines: G Sasi Bhushana Rao, Wiley India 2013.
4. Networks, Lines and Fields John D.Ryder, Second Edition, Pearson Education, 2015.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-II Semester	Course Code: BT24EC2203	L	T	P	C
		3	0	0	3
ELECTRONIC CIRCUIT ANALYSIS					

Course Objectives:

The main objectives of this course are:

- To learn hybrid- π parameters at high frequency and compare with low frequency parameters.
- Learn and understand the purpose of cascading of single stage amplifiers and derive the overall voltage gain.
- Analyze the effect of negative feedback on amplifier characteristics and derive the characteristics.
- Learn and understand the basic principle of oscillator circuits and perform the analysis of different oscillator circuits.
- Compare and analyze different Power amplifiers like Class A, Class B, Class C, Class AB and other types of amplifiers.
- Analyze different types of tuned amplifier circuits.

Course Outcomes:

At the end of this course the student can able to

CO1: Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
CO2: Design and analysis of multistage amplifiers using BJT and FET and Differential amplifier using BJT.
CO3: Apply the Feedback Principle and Concept in Amplifier Design.
CO4: Perform Generalized Analysis of Feedback Amplifiers.
CO5: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
CO6: Know the classification of the power and tuned amplifiers and their analysis with performance comparison.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	-	-	-	-	-	1	1	-
CO2	3	2	2	1	-	-	-	-	-	1	1	-
CO3	3	2	2	1	-	-	-	-	-	1	1	-
CO4	3	2	2	1	-	-	-	-	-	1	1	-
CO5	3	2	2	1	-	-	-	-	-	1	1	-
CO6	3	2	2	1	-	-	-	-	-	1	1	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-
CO6	1	-

UNIT-I Small Signal High Frequency Transistor Amplifier models:
BJT: Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductance, Hybrid π capacitances, validity of hybrid π model, determination of high- frequency parameters in terms of low-frequency parameters , CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.
FET: Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT-II
Multistage Amplifiers: Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Differential amplifier using BJT.
UNIT-III
Feedback Amplifiers: Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

Unit-IV
Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC- phase shift and Wien bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT, Frequency and amplitude stability of oscillators.

UNIT-V
Power Amplifiers: Classification of amplifiers(A to H), Class A power Amplifiers, Class B Push-pull amplifiers, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks.
Tuned Amplifiers: Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, staggered tuned amplifiers.

Text Books:

1. Integrated Electronics- J. Millman and C.C. Halkias, Tata Mc Graw-Hill, 1972.
2. Electronic Devices and Circuits Theory– Robert L. Boylestad and Louis Nashelsky, Pearson / Prentice Hall, Tenth Edition, 2009.
3. Electronic Devices and Integrated Circuits– B.P. Singh, Rekha, Pearson publications, 2006.

References:

1. Electronic Circuit Analysis and Design–Donald A. Neaman, Mc Graw Hill, 2010.
2. Microelectronic Circuits-Sedra A.S. and K.C.Smith, Oxford University Press, Sixth Edition, 2011.
3. Electronic Circuit Analysis-B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-II Semester	Course Code: BT24EC2204	L	T	P	C
		3	0	0	3
ANALOG COMMUNICATIONS					

Course Objectives:
The main objectives of this course are:

- To understand the various amplitude modulation and demodulation techniques & systems.
- To understand the complex low pass representations, SSB and VSB modulations.
- To understand the angle modulation and demodulation techniques.
- To understand the functions of AM and FM transmitters and receivers.
- To understand the effect of noise on the performance of AM and FM receivers and the principles of PAM, PWM, and PPM, TDM, and FDM techniques

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

CO1: Describe the Modulation and Demodulation techniques of standard AM.
CO2: Compare different types of Amplitude Modulation and Demodulation techniques.
CO3: Analyze the concepts of generation and detection of Angle Modulated signals.
CO4: Outline the Radio Receivers with different sections.
CO5: Interpret the Radio Transmitters completely.
CO6: Illustrate the noise performance in Analog Modulation techniques and also the concepts of Pulse Analog Modulation and Demodulation techniques.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	2	2	-	-	-	-	-	-	-
CO5	3	3	-	3	2	-	-	-	-	-	-	-
CO6	3	2	2	1	2	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

Unit–I

Amplitude Modulation: Introduction to Fourier transform, Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Time domain and Frequency domain descriptions, Single tone modulation, Power relations in AM waves, Generation of AM waves: Square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector, Related problems.

Unit–II

DSB & SSB Modulation: Double sideband suppressed carrier modulator: Time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulator, Ring Modulator, Detection of DSBSC Waves: Coherent detection, Quadrature Null Effect, COSTAS Loop, Squaring Loop. Single sideband suppressed carrier modulator: Time domain and Frequency domain description, Generation of SSBSC Waves: Frequency discrimination method, Phase discrimination method, Demodulation of SSB Waves: Coherent Detection. Vestigial sideband modulation: Time domain description, Frequency domain description, Generation of VSB Modulated wave, Envelope detection of a VSB Wave pulse Carrier, Comparison of different AM Techniques, Applications of different AM Systems, Related problems.

Unit–III

Angle Modulation: Introduction, Basic concept of phase modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave, Generation of FM Waves: Direct Method, Indirect Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM, Related problems.

Unit–IV

Radio Transmitters: Classification of Transmitters, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter: Variable reactance type and Phase modulated FM Transmitter, Frequency stability in FM Transmitter.

Radio Receivers: Receiver Types: Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics, Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Amplitude limiting, Comparison of FM & AM Receivers, Communication Receivers, Extension of super heterodyne principle and additional circuits.

Unit–V

Noise: Review of noise and noise sources, Noise figure, Noise in Analog communication Systems: Noise in DSB & SSB Systems, Noise in AM System and Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & De-emphasis.

Pulse Analog Modulation: Types of Pulse modulation, PAM (Single polarity, double polarity), PWM: Generation & Detection of PWM, PPM: Generation and Detection of PPM, Time Division Multiplexing, TDM Vs FDM.

Text Books:

1. Communication Systems, Simon Haykin, Michael Moher, Wiley, 5th Edition, 2009.
2. Principles of Communication Systems, H Taub, D L Schilling, Gautam Sahe, TMH, 4th Edition, 2017.
3. Modern Digital and Analog Communication Systems, B.P. Lathi, Zhi Ding, Hari Mohan Gupta, Oxford University Press, 4th Edition, 2017.

Reference Books:

1. Electronics & Communication Systems, George Kennedy, Bernard Davis, SRM Prasanna, TMH, 6th Edition, 2017.
2. Communication Systems, RP Singh, SD Sapre, TMH, 3rd Edition, 2017.
3. Communication Systems (Analog and Digital), Dr. Sanjay Sharma, Katson Books, 7th Reprint Edition, 2018.

Web Links:

1. http://nptel.ac.in/courses/117102059/Prof.SurendraPrasad.
2. https://ict.iitk.ac.in/wp-content/uploads/EE320A-Principles-Of-Communication-CommunicationSystems-4ed-Haykin.pdf.
3. https://www.scribd.com/document/266137872/sanjay-sharma-pdf.
4. http://bayanbox.ir/view/9144090835198890 86/Book-Modern-Digital-And-AnalogCommunication-Systems-4th-edition-by-Lathi.pdf.
5. https://soaneemrana.org/onewebmedia/ELECTRONICS%20COMMUNICATION%20SYSTEM%20BY%20GEORGE%20KENNEDY.pdf

PWM: Generation & Detection of PWM, PPM: Generation and Detection of PPM, Time Division Multiplexing, TDM Vs FDM.

Text Books:

4. Communication Systems, Simon Haykin, Michael Moher, Wiley, 5th Edition, 2009.
5. Principles of Communication Systems, H Taub, D L Schilling, Gautam Sahe, TMH, 4th Edition, 2017.
6. Modern Digital and Analog Communication Systems, B.P. Lathi, Zhi Ding, Hari Mohan Gupta, Oxford University Press, 4th Edition, 2017.

Reference Books:

4. Electronics & Communication Systems, George Kennedy, Bernard Davis, SRM Prasanna, TMH, 6th Edition, 2017.
5. Communication Systems, RP Singh, SD Sapre, TMH, 3rd Edition, 2017.
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Web Links:

6. http://nptel.ac.in/courses/117102059/Prof.SurendraPrasad.
7. https://ict.iitk.ac.in/wp-content/uploads/EE320A-Principles-Of-Communication-CommunicationSystems-4ed-Haykin.pdf.
8. https://www.scribd.com/document/266137872/sanjay-sharma-pdf.
9. http://bayanbox.ir/view/9144090835198890 86/Book-Modern-Digital-And-AnalogCommunication-Systems-4th-edition-by-Lathi.pdf.
10. https://soaneemrana.org/onewebmedia/ELECTRONICS%20COMMUNICATION%20SYSTEM%20BY%20GEORGE%20KENNEDY.pdf

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-II Semester	Course Code: BT24EC2205	L	T	P	C
		0	0	3	1.5
SIGNALS AND SYSTEMS LAB					

Course Outcomes:

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

CO1: Generate and characterize various continuous and discrete time signals.
CO2: Perform the basic operations on the signals.
CO3: Analyze the spectral characteristics of signals using Fourier analysis.
CO4: Examine the concepts of Correlation, Convolution and Deconvolution.
CO5: Analyze the systems using Laplace transform.
CO6: Analyze the systems using Z-transform.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	-	-	-	-	-	1	1	-
CO2	3	2	2	1	-	-	-	-	-	1	1	-
CO3	3	2	2	1	-	-	-	-	-	1	1	-
CO4	3	2	2	1	-	-	-	-	-	1	1	-
CO5	3	2	2	1	-	-	-	-	-	1	1	-
CO6	3	2	2	1	-	-	-	-	-	1	1	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	3	1
CO2	3	1
CO3	3	1
CO4	3	1
CO5	3	1
CO6	3	1

List of Experiments:

I. Generation of Basic Signals (Analog and Discrete)
   1. Unit step
   2. Unit impulse
   3. Unit Ramp
   4. Sinusoidal
   5. Signum

II. Operations on signals
    1. Addition & Subtraction
    2. Multiplication & Division
    3. Maximum & minimum

III. Energy and power of signals, even and odd signals

IV. Transformation of the independent variable
    1. Shifting (Delay & Advance)
    2. Reversing
    3. Scaling

V. Convolution & Deconvolution

VI. Correlation

VII. Fourier Series Representation

VIII. Fourier Transform and Analysis of Fourier Spectrum

IX. Laplace Transforms

X. Z-Transforms

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-II Semester	Course Code: BT24EC2206	L	T	P	C
		0	0	3	1.5
ELECTRONIC CIRCUIT ANALYSIS LAB					

Course Outcomes:

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

CO1: Determination of cut-off frequencies and bandwidth of the small signal high frequency transistor amplifier using BJT.

CO2: Test the effect of negative feedback on amplifier characteristics and derive the characteristics.

CO3: Measurement of frequency of the RC and LC oscillators.

CO4: Calculation of gain for multistage amplifiers using BJT.

CO5: Examine the different types of the power amplifiers.

CO6: Design a tuned amplifier for a particular frequency.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	-	-	-	-	-	1	1	-
CO2	3	2	2	1	-	-	-	-	-	1	1	-
CO3	3	2	2	1	-	-	-	-	-	1	1	-
CO4	3	2	2	1	-	-	-	-	-	1	1	-
CO5	3	2	2	1	-	-	-	-	-	1	1	-
CO6	3	2	2	1	-	-	-	-	-	1	1	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-
CO6	1	-

Note: The students are required to design the circuit and perform the simulation using Multisim/ Equivalent Industrial Standard Licensed simulation software tool. Further they are required to verify the result using necessary hardware equipment.

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Determination of Ft of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt's Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Bootstrapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

Equipment Required: Software:

i. Multisim/Equivalent Industrial Standard Licensed simulation software tool.
ii. Computer Systems with required specifications

Hardware Required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

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

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)
BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-II Semester	Course Code: BT24BS2205	L	T	P	C
		0	1	2	2
SOFT SKILLS					

Course Objectives:

- To prepare to face global competition for employment and excellence in profession.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

Course Outcomes:

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

CO1: Assimilate and understood the meaning and importance of soft skills and learn how to develop them.
CO2: Understand the significance of soft skills in the working environment for Professional excellence.
CO3: Prepare to undergo the placement process with confidence and clarity.
CO4: Ready to face any situation in life and equip themselves to handle them effectively.
CO5: Understand and learn the importance of etiquette in both professional and personal life.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	2	3	3	-	3
CO2	-	-	-	-	-	-	-	3	3	3	-	3
CO3	-	-	-	-	-	-	-	3	3	3	2	3
CO4	-	-	-	-	-	-	-	3	3	3	-	3
CO5	-	-	-	-	-	-	-	3	3	3	-	3

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

UNIT–1: INTRODUCTION

Introduction-, Emergence of life skills, Definition & Meaning, Importance& need, reasons for skill gap, Analysis--Soft Skills vs. Hard skills, Linkage between industry and soft skills, Challenges, Personality Developments. Soft Skills, Soft Skills vs. English - Improving Techniques.

UNIT–II: Intra-Personal:

Definition-Meaning – Importance-SWOT analysis, Johari windows - Goal Setting- quotient skills - Emotional Intelligence- Attitudinal skills - Right thinking- Problem Solving-Time management, stress management.

UNIT–III: Inter-Personal:

Definition–Meaning–Importance-Communications skills-Team Work, managerial skills - Negotiation skills-Leadership skills, corporate etiquettes.

UNIT–IV: Verbal Skills:

Definition and Meaning-Listening skills, need- types, advantages, Importance-Improving Tips for Listening, Speaking, need- types, advantages, Importance- Improving Tips, Reading- Writing Skills, Report, Resume, statement of purpose, need- types, advantages, Importance-Improving Tips .

UNIT–V: Non Verbal Skills & Interview Skills

Definition and Meaning – Importance- Facial Expressions- Eye Contact – Proxemics-Haptics-Posture, cross cultural body language, body language in interview room, appearance and dress code –Kinetics-Para Language -tone, pitch, pause, neutralization of accent, use of appropriate language, Interview skills, interview methods and questions.

Text Books:

1. Sherfield, M.Robertatal, Cornerstone Developing Soft Skills, 4/e, Pearson Publication, New Delhi, 2014.
2. Alka Wadkar, Life Skills for Success, 1/e, Sage Publications India Private Limited, 2016.

Reference Books:

1. Sambaiah. M. Technical English, Wiley publishers India. New Delhi. 2014.
2. Gangadhar Joshi, From Campus to Corporate, SAGETEXT.
3. Alex.K, Soft Skills, 3rd ed. S.Chand Publication, New Delhi, 2014.
4. Meenakshi Raman and Sangita Sharma, Technical Communication: Principle and Practice, Oxford University Press, 2009.
5. Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand Publication, New Delhi, 2014.
6. Stephen Covey, Seven Habits of Highly Effective People, JMD Book, 2013.

Online Learning Resources:

- *https://onlinecourses.nptel.ac.in/noc20_hs60/preview*
- http://www.youtube.com/@softskillsdevelopment6210
- https://youtube.com/playlist?list=PLLy_2iUCG87CQhELCytvXh0E_y-OO1_q&si=Fs05Xh8ZrOPsR8F4
- https://www.coursera.org/learn/people-soft-skills-assessment?language=English
- https://www.edx.org/learn/soft-skills

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

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

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year-II Semester	Course Code: BT24ME2207	L	T	P	C
		1	0	2	2
DESIGN THINKING & INNOVATION					

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.

Course Outcomes:

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

CO1: Define the concepts related to design thinking.
CO2: Explain the fundamentals of Design Thinking and innovation.
CO3: Apply the design thinking techniques for solving problems in various sectors.
CO4: Analyze to work in a multi disciplinary environment.
CO5: Evaluate the value of creativity.
CO6: Understand the critical components of startup management, including the planning, reliability, and marketing strategies required to launch and sustain a new business or product in a competitive market.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2	2	-	2	-	2	3	2	-	2
CO2	3	-	2	2	-	2	-	2	3	2	-	2
CO3	3	-	2	2	-	2	-	2	3	2	-	2
CO4	3	-	2	2	-	2	-	2	3	2	-	2
CO5	3	-	2	2	-	2	-	2	3	2	-	2
CO6	3	-	2	2	-	2	-	2	3	2	-	2

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	3	-
CO2	3	-
CO3	3	-
CO4	3	-
CO5	3	-
CO6	3	-

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.

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 lid well, Kritina holden, & Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Ches brough.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

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Phone: Off. 0884-2300906
Fax: 0884-2300901

PROCEEDINGS OF THE
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
Kakinada-533003, Andhra Pradesh (India)

Proc. No. JNTUK/DAP/Evaluation Procedure for DT&I/Approval/2025 Date: 27.01.2025

Sub: DAP – Academic Planning – Evaluation Procedure for Design Thinking and Innovation (L-T-P-C) (1-0-2-2) - Orders - Issued.

Read: e-Office No. 2690537 approved by Honourable Vice Chancellor dated 27.01.2025

***

ORDER:

With reference cited above, the Honorable Vice Chancellor, JNTUK is pleased to approve the recommendations for Evaluation Procedure for Design Thinking and Innovation (L-T-P-C) (1-0-2-2) as follows:

- **Evaluation Procedure for Design Thinking and Innovation (L-T-P-C) (1-0-2-2):**

The performance of a student **for Design Thinking and Innovation** shall be evaluated with a maximum of 100 marks.
A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together.

Assessment Method	Marks
Internal Assessment	30
Semester End Examination	70
Total	**100**

The distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

a) Internal Evaluation Procedure

i) **Of the internal marks of 30, Day to Day Evaluation in the lab will be given a maximum of 7.5 Marks (25%) and Mid Exam(theory), a maximum of 22.5 Marks (75%).**

ii) During the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment. **30 Marks will be scaled down to 22.5 Marks.**

a. Objective paper shall contain for 05 short answer questions with 2 marks each OR maximum of 20 bits for 10 marks.
b. Subjective paper shall contain 3 questions of internal choice (i.e., either-or type questions of which student has to answer one from each either-or type of questions, each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.
c. 5 marks for assignment
d. Mid examinations of Design thinking and Innovation to be conducted by the corresponding college.

Note:

- The subjective paper shall contain 3 either-or type questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
- Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.

iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.

iv) First midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.

v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

vi) If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other.

b) **End Examination (Only Practical's) Evaluation:**
The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.

- Procedure: 20 marks
- Experimental work & Results: 30 marks
- Viva voce: 20 marks.

REGISTRAR
REGISTRAR
J.N.T. University Kakinada
Kakinada-533003.

To
The Director of Evaluation, JNTUK Kakinada.
Copy to the Director, Academic Planning, JNTUK Kakinada.
Copy to the Secretary to Hon'ble Vice-Chancellor, JNTUK Kakinada.
Copy to the PA to the Registrar, JNTUK Kakinada.

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

Department of Computer Science & Engineering

Dt. 08.05.2025

To

The Head of the Department,
Department of ~~EEE~~ / ~~ME~~ / ECE / ~~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. G. SATYANARAYANA, Professor & Head, Department of CSE 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,

8/5/25

(Dr. G. SATYANARAYANA),
Professor & Head,
Department of CSE, DNRCET (A).

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

Copy submitted to:

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

D. N. R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS) ECE

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

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Accredited with A++ Grade with 3.73/4 CGPA by NAAC and Accredited by NBA (B. Tech- CSE, ECE & EEE)

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

Department of Computer Science & Engineering
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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 course syllabus offered to other departments in accordance to JNTUK course structure and syllabus
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

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.

D. N. R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

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

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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.

University Nominee

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

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

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Year - I Semester	Course Code: BT24CS2208	L	T	P	C
		0	1	2	2

PYTHON PROGRAMMING LAB

Course Objectives:

- Understand built-in Python data structures like lists, tuples, sets, and dictionaries.
- Implement basic array and string operations.
- Implement Singly Linked Lists, Doubly Linked Lists, and Circular Linked Lists.
- Develop skills in data manipulation, list comprehension, dictionary comprehension, and set comprehension for efficient code writing and problem solving.
- Learn how to implement and compare search and sort algorithms, including both linear and binary search, as well as sorting algorithms like bubble sort, selection sort, and quick sort, and analyze their efficiency.
- Learn how to design and implement operations like insertion, deletion, traversal, and searching in these data structures to handle real-world data storage and retrieval needs.

Course Outcomes:

At the end of the course students will be able to

1. Apply the basics of programming in the Python language (L3)
2. Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming (L4)
3. Summarize the properties, interfaces, and behaviors of basic abstract data types (L4).
4. Discuss the computational efficiency of the principal algorithms for sorting & searching (L5).
5. Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs (L6).
6. Demonstrate different methods for traversing trees (L6)

List of Experiments:

1. Write a Python program for class, Flower, that has three instance variables of type str, int, and float that respectively represent the name of the flower, its number of petals, and its price. Your class must include a construct or method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type.

2. Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area () and perimeter (). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area () and perimeter () methods.

3. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter

4. Write a python program to implement Method Over loading and Method Overriding.

5. Write a Python program to illustrate the following comprehensions: a) List Comprehensions b) Dictionary Comprehensions c) Set Comprehensions d) Generator Comprehensions

6. Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list. Example: Original list: [1,2,3,4,5,6,7,8,9]

7. Combinations of 2 distinct objects: [1,2] [1,3] [1,4] [1,5] [7,8] [7,9] [8,9].

8. Write a program for Linear Search and Binary search.

9. Write a program to implement Bubble Sort and Selection Sort.

10. Write a program to implement Merge sort and Quick sort.

11. Write a program to implement Stacks and Queues.

12. Write a program to implement Singly Linked List.

13. Write a program to implement Doubly Linked list.

14. Write a program to implement Binary Search Tree.

RK
(Dr. N. RAMA KRISHNAIAH)
Professor & Head,
Dept. of Computer Science & Engineering,
UCEK, JNTUK, Kakinada, AP.

Head of the Department
Department of Computer Science & Engineering
G.N.R. College of Engineering & Technology
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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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

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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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II Year I Semester

L	T	P	C
2	1	0	3

UNIVERSAL HUMAN VALUES –

UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

SUB Code: BT24HS2101 (22-24)

UNIT I

Introduction to Value Education (6 lectures and 3 tutorials for practice session)
Lecture1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about One self 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.
Lecture8: 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
Lecture12: 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 3tutorials 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
Lecture18: Vision for the Universal Human Order
Tutorial9: Practice Session PS9 Exploring Systems to fulfill Human Goal

UNIT IV

Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)
Lecture19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfillment 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
Lecture22: The Holistic Perception of Harmony in Existence
Tutorial11: 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
Tutorial12:PracticeSessionPS12ExploringEthicalHumanConduct
Lecture25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture26: 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 Tutorial14: 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
PS8ExploringtheFeelingofRespect
PS9ExploringSystemstofulfilHumanGoal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence) PS10
Exploring the Four Orders of Nature
PS11ExploringCo-existenceinExistence

PracticeSessionsforUNITV–ImplicationsoftheHolisticUnderstanding–aLookatProfessional Ethics
PS12ExploringEthicalHumanConduct
PS13ExploringHumanisticModelsinEducation
PS14ExploringStepsofTransitiontowardsUniversalHumanOrder

READINGS:
Textbook and Teachers Manual
a. TheTextbook

HOD
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II Year II Semester

L	T	P	C
2	0	0	2

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

SUB: code: (DR-24) 13T24HS2201

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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Dept of Basic Sciences & Humanities (English)

Meeting of BOS Schedule, A.Y. 2025-26

Minutes of meeting of Board of Studies, Dept of Basic Sciences & Humanities (Soft Skills) held on 04-04-2025 at 2:30 P.M with the following points of agenda.

Venue: English Language Lab

Meeting held on: 04-04-2025 at 2:30 P.M

Mode of conducting meeting: Zoom online platform

Meeting link:

https://us06web.zoom.us/j/2664871556?pwd=pFKnG7HYNLabpf3yYPHq0tnDoHPNdj.1&omn=81412772151

Agenda:

1. Introduction of members
2. To discuss and finalize the proposed II B. Tech. II Semester Soft Skills Lab course of DR -24 Regulations. **(Annexure-A)**
3. To finalize the Evaluation procedure for Continuous Internal Evaluation (CIE) andSemester End Evaluation (SEE) **(Annexure-B)**
4. Ratification of Course Objectives and Course Out comes, CO – PO Mapping for theproposed subjects. **(Annexure-C)**
5. Finalization of Text Books and Reference Books. **(Annexure-D)**
6. Brief review on I B. Tech. I & II Semester Communicative English (Theory and Lab) Syllabus.
7. Any other item with the permission of the chairman.

Members Present:

S. NO	Name(s) of the Member(s)/	Designation	Designation in Committee	Signature
1.	Dr. G G Ratnam	Professor & Head, Dept of BS&H	Chairperson	
2.	Dr. K. Sree Ramesh	Professor, Dept. of English Adikavi Nannaya University, Rajamahendravaram	Member (University Nominee)	

3.	Dr. K Vijaya Lakshmi	Associate professor Dept. of English Vishnu Institute of Technology Bhimavaram	Member (Subject expert)	online
4.	Dr. Bh V N Lakshmi	Head Dept. of English &Foreign Language, SRKR Engineering College, Bhimavaram	Member (Subject expert)	online
5.	Mr. B Meshak Raju	Asst. Professor of English, DNRCET	Member	
6.	Mr. V Praveen	Asst. Professor of English, DNRCET	Member	
7.	Mr. G. Moshe	Asst. Professor of English, DNRCET	Member	
8.	Mr. T. Pranams	Managing Director Pranams Hotels, Bhimavaram	Member (Industrial Expert)	
9.	Ms. K. Siva Syamala	R.No: 149P5A0503 Batch: 2013-17	Member (College alumni)	

Minutes of meeting of Board of Studies, Dept of Basic Sciences & Humanities (Soft Skills)held on 04-04-2025 at 2:30 P.M with the following Resolutions:

At the outset, the principal of DNRCET presented his gratitude to the university nominee and other members of BOS and handed over the session to the chairman of BOS.

Resolution-1: Introduction of Members

The BOS chairman welcomed and introduced the eminent professors of BOS Meeting. He briefed them about structure and pattern of the course. The BOS members expressed their appreciation for novel structure of curriculum and content 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.

Resolution-2: Finalize of proposed II B. Tech. II Semester Soft Skills Labcourse of DR -24 Regulations. (Annexure-A)

Resolved the proposed II B. Tech II Semester Soft Skills Lab course under the DR-24 Regulations were discussed in detail. After considering the inputs from all members, the course was finalized and approved for implementation in the upcoming academic year 2025-26.

Resolution-3: Finalization of Evaluation Procedure for CIE and SEE. (Annexure-B)

Resolved course evaluation procedure, the course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination shall be conducted for 70 marks by the concerned teacher and an expert were discussed and finalized.

Resolution-4: Ratification of Course Objectives and Course Outcomes, CO – PO Mapping for the Proposed Subjects. (Annexure-C)

Resolved the Course Objectives and Course Outcomes for the proposed subjects were reviewed and ratified. Additionally, the CO-PO mapping was discussed and approved, ensuring alignment with the educational goals of the program.

Resolution-5: Finalization of Text Books and Reference Books. (Annexure-D)

Resolved the textbooks and reference books for the II B. Tech II Semester Soft Skills course was reviewed. The following books were approved as the primary textbooks

Resolution-6: Brief review on I B. Tech. I & II Semester Communicative English (Theory and Lab) Syllabus.

Resolved the proposed I B. Tech I & II Semester Communicative English (Theory and Lab) courses under the DR-24 Regulations were discussed in detail. After considering the inputs from all members, the courses were finalized and approved for implementation in the upcoming academic year 2024-25.

Resolution-7: Any Other Item with the Permission of the Chairman

Resolved the additional items raised with the permission of the Chairman were discussed.

The chairman concluded the meeting by summarizing all the agenda points and resolutions and closed with a note of thanks to all members for their suggestions and participation.

HEAD
Dept. of Basic Sciences
D.N.R. College of Engg. & Tech
BHIMAVARAM-534 202.

Annexure –A

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

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Electronics and Communication Engineering (DR24-IInd Year Course Structure

B.Tech. – II Year I Semester

S.No.	Course Code	Title	L	T	P	Credits
1	BT24BS2104	Probability theory and stochastic process	3	0	0	3
2	BT24HS2101	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	BT23EC2101	Signals and Systems	3	0	0	3
4	BT23EC2102	Electronic Devices and Circuits	3	0	0	3
5	BT23EC2103	Switching Theory and Logic Design	3	0	0	3
6	BT23EC2104	Electronic Devices and Circuits Lab	0	0	3	1.5
7	BT23EC2105	Switching Theory and Logic Design Lab	0	0	3	1.5
8	BT24CS2108	Data Structures using Python	0	1	2	2
9	BT24BS2106	Environmental Science	2	0	0	-
Total			16	2	08	20

B.Tech. - II Year II Semester

S.No.	Course Code	Title	L	T	P	Credits
1	BT24HS2201	Managerial Economics and Financial Analysis	2	0	0	2
2	BT24EC2201	Linear Control Systems	3	0	0	3
3	BT24EC2202	Electromagnetic Waves and Transmission Lines	3	0	0	3
4	BT24EC2203	Electronic Circuit Analysis	3	0	0	3
5	BT24EC2204	Analog Communications	3	0	0	3
6	BT24EC2205	Signals and Systems Lab	0	0	3	1.5
7	BT24EC2206	Electronic Circuit Analysis lab	0	0	3	1.5
8	BT24BS2205	Soft Skills	0	1	2	2
9	BT24HS2203	Design Thinking &Innovation	1	0	2	2
Total			15	1	10	21
Mandatory Community Service Project Internship of 08weeks duration during summer Vacation						

HEAD
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Mechanical Engineering (DR24-IInd Year Course Structure)

B.Tech II Year I Semester

S.No.	Category	Title	L	T	P	Credits
1	BT24BS2103	Numerical Methods and Transform Techniques	3	0	0	3
2	BT24HS2101	Universal Human Values–Understanding Harmony& Ethical Human Conduct	2	1	0	3
3	BT24ME2101	Thermodynamics	2	0	0	2
4	BT24ME2102	Mechanics of Solids	3	0	0	3
5	BT24ME2103	Material Science and Metallurgy	3	0	0	3
6	BT24ME2104	Mechanics of Solids and Materials Science Lab	0	0	3	1.5
7	BT24ME2105	Computer-aided Machine Drawing	0	0	3	1.5
8	BT24CS2107	Python programming Lab	0	0	2	1.0
9	BT24EC2106	Embedded Systems and IoT	0	1	2	2
10	BT24BS2106	Environmental Science	2	0	0	-
		Total	15	2	10	20

B.Tech. II Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	BT24ME2201	Industrial Management	2	0	0	2
2	BT24BS2201	Complex Variables, Probability and Statistics	3	0	0	3
3	BT24ME2202	Manufacturing processes	3	0	0	3
4	BT24ME2203	Fluid Mechanics & Hydraulic Machines	3	0	0	3
5	BT24ME2204	Theory of Machines	3	0	0	3
6	BT24ME2205	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5
7	BT24ME2206	Manufacturing processes Lab	0	0	3	1.5
8	BT24BS2205	Soft Skills	0	1	2	2
9	BT24ME2207	Design Thinking & Innovation	1	0	2	2
		Total	15	1	10	21
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation						

HEAD
Dept. of Basic Sciences
D.N.R. College of Engg. & Tech
BHIMAVARAM-534 202.

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

Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada
Accredited with A** Grade by NAAC & Accredited by NBA (B. TECH – CSE, ECE & EEE)
Ph: 08816-221238 Email: dnrcet@gmail.com website: https://dnrcet.org

DEPARTMENT OF BASIC SCIENCES & HUMANITIES

Year/Semester	II.B.Tech-II Sem	L	T	P	C
Regulation Year	DR-24	0	1	2	2
Name of the Subject	SOFT SKILLS- BT24BS2205				
Branch	ME and ECE				

Course Objectives:

- To prepare to face competition for employment and excellence in profession.
- To help the students understand and build interpersonal and intrapersonal skills that will enable them to lead meaningful professional life.

Course Outcomes:

COs	Statements	Blooms Level
CO1	Assimilate and understand the meaning and importance of soft skills and learn how to develop them.	K1
CO2	Understand the significance of soft skills in the working environment for professional excellence.	K2
CO3	Prepare to undergo the placement process with confidence and clarity.	K3
CO4	Ready to face any situation in life and equip themselves to handle them effectively.	K4
CO5	Understand and learn the importance of etiquette in both professional and personal life	K2

UNIT – 1: INTRODUCTION

Introduction- Emergence of life skills, Definition & Meaning, Importance & need, reasons for skill gap, Analysis--Soft Skills vs Hard skills, Soft Skills for Industry, Personality Developments. Soft Skills, Soft Skills - English - Improving Techniques.

UNIT – II: Intra-Personal:

Definition-Meaning – Importance-SWOT analysis, Johari windows - Goal Setting-quotient skills - Emotional Intelligence- Attitudinal skills - Right thinking- Problem Solving-Time management, stress management.

UNIT – III: Inter-Personal:

Definition – Meaning – Importance-Communications skills- Team Work, managerial skills-Negotiation skills- Leadership skills, corporate etiquettes.

UNIT – IV: Verbal Skills:

Verbal Communication Skills: Listening skills, need- types, advantages, Importance-Improving Tips for listening, Speaking Skills, need- types, advantages, Importance-Improving Tips, Reading - Writing Skills, Report, Resume, statement of purpose, need- types, advantages, Importance-Improving Tips.

UNIT – V: Non Verbal Skills& Interview skills

Definition and Meaning – Importance- Facial Expressions- Eye Contact – Proxemics-Haptics -Posture, cross cultural body language, body language in interview room, appearance and dress code – Kinesthetic- Para Language - tone, pitch, pause, neutralization of accent, use of appropriate language, Interview skills, interview methods and questions.

Text Books:

1) Sherfield, M. Robert at al, Cornerstone Developing Soft Skills, 4/e, PearsonPublication, New Delhi, 2014.
2) Alka Wadkar, Life Skills for Success, 1/e, Sage Publications India Private Limited,2016.

Reference Books:

1. Sambaiah.M. Technical English, Wiley publishers India. New Delhi. 2014.
2. Gangadhar Joshi, From Campus to Corporate, SAGE TEXT.
3. Alex.K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
4. Meenakshi Raman and Sangita Sharma, Technical Communication: Principle andPractice, Oxford University Press, 2009.
5. Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand Publication,New Delhi, 2014.
6. Stephen Covey, Seven Habits of Highly Effective People, JMD Book, 2013.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc20_hs60/preview
- http://www.youtube.com/@softskillsdevelopment6210
- https://youtube.com/playlist?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&si=Fs05Xh8ZrOPsR8F4
- https://www.coursera.org/learn/people-soft-skills-assessment?language=English
- https://www.edx.org/learn/soft-skills

1. Dr.G.G. Ratnam (HOD)
2. B. Meshak Raju
3. V. Praveen
4. G. Hoshes

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Dept. of Basic Sciences
D.N.R. College of Engg. & Tech
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D.N.R. COLLEGE OF ENGINEERING& TECHNOLOGY
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Ph: 08816-221238 Email: dnrcet@gmail.com website: https://dnrcet.org

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

Copy to.

HODs	CE	EEE	ECE	CSE	MBA.
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D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY(Autonomous)
BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

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

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

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

DR24

H.T.No: | | | | | | | | | | | Course Code: BT24BS2104

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

II B. Tech. I Semester End Examinations

PROBABILITY THEORY AND STOCHASTIC PROCESS

Time: 3hours **Max.Marks:70**

1. Answer all the questions form Section – A. Each question carries 2 Marks.
2. Answerone question from each unit in section – B. Each question carries 10 Marks.

S. No.		PART – A (Answer All Questions	20 Marks BTL	CO	M
1	a	A jar contains two white and three black balls. Sample of size 4 is made. What is the probability that the sample is in the order white, black, white, black?	1	1	2
	b	Two dice are thrown. What is the probability that the sum on the dice is twelve?	1	1	2
	c	What is the relation between CDF and PDF of a discrete random variable?	1	2	2
	d	X and Y are two independent random variables with E[X] = 4, E[Y] = 6. Find E[4X-2Y]?	1	2	2
	e	Find the mean value of a uniform random variable?	1	3	2
	f	Write the Jointly Gaussian Random density function for two random variables?	1	3	2
	g	Define the auto-covariance of a random process?	1	4	2
	h	When a random process is called SSS process? Explain?	1	4	2
	i	Define effective noise temperature?	1	5	2
	j	What is Mean value of System Response for Random Signal Response of Linear Systems?	1	5	2
		PART – B (All Questions Carry Equal Marks)	**50 Marks**		
		UNIT – I	**10 Marks**		
2	a	Define a discrete random variable and discuss the characteristics of Poisson random variable using its probability density and distribution functions?	1	1	5
	b	Explain about the distribution and density functions of exponential random variable with neat sketches?	2	1	5
		OR			
3	a	State and prove the properties of cumulative distribution function (CDF) of X?	2	1	5
	b	Suppose there is an error probability of 0.05 per word in typing using an electronic type-writer machine. What is the probability that there will be more than one error in a page of 120 words?	1	1	5
		UNIT – II	**10Marks**		
4	a	Consider the random variable X with probability density function $f_X(x) = \begin{cases} \left(\frac{1}{6}\right)x, & 2 \le x \le 4 \\ 0, & otherwise \end{cases}$ Find E[X],E[X^2]	1	2	5

	b	Consider a random variable, X, with the PMF as tabulated below x | 0 | 1 | 2 | 3 $p(x)$ | 1/8 | 1/8 | 1/4 | 1/2 Find mean value of X, variance of X	1	2	5
		OR			
5	a	Show that the variance of a uniform random variable (a, b), is. $\frac{(b-a)^2}{12}$	2	2	5
	b	Let X is a random variable. Find the density function of Y=exp(X) Carefully plot $f_Y(y)$	1	2	5
		UNIT – III		**10 Marks**	
6	a	Show that if $X=Y$, then $Cov[X,Y]=Var[X]=Var[Y]$.	2	3	5
	b	Explain how E[X],E[Y],E[X^2] and E[Y^2] are computed using joint probability density function of two random variables X and Y	2	3	5
		OR			
7	a	List the properties of jointly Gaussian random variables.	2	3	5
	b	Define joint characteristic function. Explain how the joint moments are obtained from joint characteristic function.	5	3	5
		UNIT – IV		**10 Marks**	
8	a	Define the following: First order stationary, Second order stationary, Nth order stationary, Wide-sense stationary	1	4	5
	b	State all the properties of auto correlation function.	2	4	5
		OR			
9	a	Derive the relation between correlation and covariance of two random variables X and Y	5	4	5
	b	What is ergodicity? Explain the concept of mean-ergodicity and autocorrelation-ergodicity with an example?	1	4	5
		UNIT – V		**10 Marks**	
10	a	Derive the relationship between cross-power spectral density and cross correlation function.	5	5	5
	b	Find the mean and mean-square values of output y (t) of an LTI system with input x (t). Assume that x (t) is a WSS process.	1	5	5
		OR			
11	a	If X (t) is a stationary process, find the power spectrum of) $Y(t) = A0+B0X(t)$ in terms of the power spectrum of X (t) if $A0$ and $B0$ are real constants.	1	5	5
	b	Derive the Wiener-Khinchin relation for power spectral density and autocorrelation function	5	5	5

Note: In Part – B, a long answer question may be split into two or three sub questions totaling ten marks or given as a single question worth of ten marks.

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

DR24

H.T.No: | | | | | | | | | | | Course Code: BT24EC2101

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

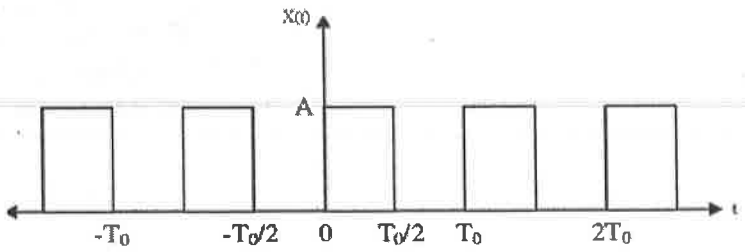
(AUTONOMOUS)

II B. Tech. I Semester End Examinations

SIGNALS AND SYSTEMS

Time: 3hours **Max.Marks:70**

1. Answer all the questions form Section – A. Each question carries 2 Marks.
2. Answerone question from each unit in section – B. Each question carries 10 Marks.

S. No.		PART – A (Answer All Questions	BTL	CO	M
				20 Marks	
1	a	Explain the impulse function and plot δ (t+2) – δ (t-3).	2	1	2
	b	Discuss about continuous time unit impulse and unit step functions.	2	1	2
	c	Describe Hilbert transform? How does it differ from other transforms?	2	2	2
	d	Express the condition for convergence of Fourier series.	2	2	2
	e	Explain the band pass sampling?	2	3	2
	f	Describe the condition for the stability of the system.	2	3	2
	g	Describe how to overcome on aliasing effect?	2	4	2
	h	Express Parseval's theorem.	2	4	2
	i	Express and prove the integration property of laplace transforms.	2	5	2
	j	Explain the ROC of the z-transform of a sequence x(n)	3	5	2
		PART – B (All Questions Carry Equal Marks)		**50 Marks**	
		UNIT – I		**10 Marks**	
2	a	Show that sinusoidal functions are orthogonal functions.	3	1	5
	b	Obtain the condition under which two signals $f(t)$ and $f(t)$ are said to be orthogonal to each other.	2	1	5
		OR			
3	a	Describe orthogonal signal space and bring out clearly its application in representing a signal.	2	1	5
	b	Explain about Time scaling, Time shifting and Time inversion properties of signals with an example.	2	1	5
		UNIT – II		**10 Marks**	
4	a	Explain the Fourier transform of signum function.	2	2	5
	b	Consider the periodic square wave x(t) as shown in figure 1 given below. Determine the complex exponential Fourier series of x(t). 	3	2	5

		OR			
5	a	Explain and prove the following properties of Fourier transform: i) Frequency shifting, ii) Differentiation in time.	2	2	5
	b	Explain in detail about complex Fourier spectrum?	3	2	5
		UNIT – III			**10 Marks**
6	a	Explain the characteristics of an ideal HPF. Explain why it can't be realized.	2	3	5
	b	Solve the convolution of the following signals using graphical method: x(t)=e-3t u(t); h(t)=u(t-3)-u(t-5).	3	3	5
		OR			
7	a	Compare Impulse, Natural and Flat-Top sampling.	5	3	5
	b	The signal $x(t) = 6\cos(10\pi t)$ is sampled by an impulse train with sampling frequency 7 Hz and 14 Hz. Draw the spectra of original and sampled signals.	3	3	5
		UNIT – IV			**10 Marks**
8	a	A continuous time signal is: x(t) = 8 cos 200πt. Find: i) Minimum sampling rate ii) If fs=400Hz, what is the continuous signal obtained after sampling. iii) What is the frequency of sinusoidal that yields samples identical to those obtained in part	5	4	5
	b	Explain detection of signal in the presence of noise using correlation.	2	4	5
		OR			
9	a	State and prove the sampling theorem for low pass signals.	3	4	5
	b	The signal x(t) = cos5πt+0.3cos10πt is instantaneously sampled. Find the maximum interval of sampling.	5	4	5
		UNIT – V			**10 Marks**
10	a	Determine the Laplace transform of the following: i) x(t) = Cos3 3t ii) x(t) = t sin at.	3	5	5
	b	Discuss various properties of ROC of Laplace transform.	2	5	5
		OR			
11	a	State and prove the following properties of Z-transform. i) Convolution property ii) Correlation property iii) Time shifting property.	3	5	5
	b	State and prove the final-value theorem of z-transform.	3	5	5

Note: In Part – B, a long answer question may be split into two or three sub questions totaling ten marks or given as a single question worth of ten marks.

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

DR24

H.T.No: | | | | | | | | | | | Course Code: BT24EC2102

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

II B. Tech. I Semester End Examinations

ELECTRONIC DEVICES AND CIRCUITS

Time: 3hours **Max.Marks:70**

1. Answer all the questions form Section – A. Each question carries 2 Marks.
2. Answerone question from each unit in section – B. Each question carries 10 Marks.

S. No.		PART – A (Answer All Questions)	BTL	CO	M
		20 Marks			
1	a	Show the position of Fermi level in N type and P type semiconductors?	1	1	2
	b	Define the following: forward static and dynamic resistances of diode?	1	1	2
	c	List out the advantages of LED?	1	2	2
	d	What is peak inverse voltage (PIV) of a diode in a rectifier circuit?	1	2	2
	e	Explain how the Q-point is obtained graphically?	2	3	2
	f	Define punch through/reach through in BJT?	1	3	2
	g	What are the benefits of h-parameters?	1	4	2
	h	What is Two port network?	1	4	2
	i	Define pinch off voltage in FET?	1	5	2
	j	What is the relation between the three JFET parameters, μ, r_d and g_m?	1	5	2
		PART – B (All Questions Carry Equal Marks)			**50 Marks**
		UNIT – I			**10 Marks**
2	a	Derive an expression for continuity equation and explain its importance	3	1	5
	b	A Ge diode has a saturation current of 10μA at 300° K. Determine the saturation current at 400°K.	5	1	5
		OR			
3	a	Derive the expression for PN junction diode forward and reverse currents with suitable diagram and necessary explanation	3	1	5
	b	The reverse bias saturation current for a P-N junction diode (Silicon type) is 2μA at 300K. Calculate the dynamic and static resistances at 100mV forward bias at 300K.	3	1	5
		UNIT – II			**10 Marks**
4	a	Explain V-I characteristics of a Tunnel diode with the help of its Fermi level diagram.	2	2	5
	b	Find Over what range of input voltage will the Zener in a voltage regulator in circuit maintain 30V across 2000Ω load ,assuming that series resistance R = 200Ω and zener current rating is 25mA.	3	2	5
		OR			
5	a	Explain with the help of neat circuit diagram the operation of Bridge rectifier.	2	2	5
	b	A full wave rectifier circuit uses two silicon diodes with a forward	3	2	5

		resistance of 20Ω each. A DC voltmeter connected across the load of 1KΩ reads 55.4 volts. Calculate i) Irms ii) Average voltage across each diode iii) ripple factor iv) Transformer secondary voltage rating			
		UNIT – III	**10 Marks**		
6	a	Explain in detail about the Ebers Moll model.	2	3	5
	b	A certain transistor has a current gain of 0.99 in CB configuration. Calculate its current gain in the CE configuration and another transistor has β=70, determine its α.	3	3	5
		OR			
7	a	Explain about DC load line and AC load line? Explain the criteria for fixing operating point.	2	3	5
	b	Determine a self bias circuit using silicon transistor to achieve a stability factor of 10, with the following specifications: V_{CC} = 16V, V_{BE} = 0.7V, V_{CEQ} = 8V, I_{CQ} = 4mA & β = 50.	5	3	5
		UNIT – IV	**10 Marks**		
8	a	Explain the hybrid small signal model for common collector configuration. Why hybrid model is used for the analysis of BJT amplifier at low frequencies? Explain.	2	4	5
	b	Determine Voltage Gain, Current Gain, Input resistance and Output resistance for a CE amplifier using NPN transistor with h_{ie} = 1200Ω, h_{re} = 0, h_{fe} = 36 and h_{oe} = 2 x 10-6 mhos, R_L = 2.5kΩ and R_S = 500Ω (neglect the effect of biasing	5	4	5
		OR			
9	a	Compare the CE, CB and CC transistor amplifier parameters.	2	4	5
	b	A CE amplifier is driven by a voltage source of internal resistance Rs = 800Ω and the load impedance of R_L=1000Ω. The h-parameters are h_{ie}=1kΩ, h_{fe}=50, h_{oe} = 25μA/V and h_{re} = 2 x 10^{-4}. Calculate current gain, voltage gain, input impedance and output impedance using exact analysis and approximate analysis.	3	4	5
		UNIT – V	**10 Marks**		
10	a	Explain the working of a depletion-type MOSFET.	2	5	5
	b	For n-Channel JFET, V_{DS}=10V and V_{GS} is changed from 3V to 4V and drain current changed -4mA to 2nA. Find g_m, r_d, and μ if V_{DS} changes from 8 to 12V and I_D changes from 3 to 3.2mA at V_{GS}=2.5V.	3	5	5
		OR			
11	a	Derive the expressions for input impedance, output impedance and voltage gain of Common Drain amplifier.	3	5	10

Note: In Part – B, a long answer question may be split into two or three sub questions totaling ten marks or given as a single question worth of ten marks.

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

DR24

H.T.No: | | | | | | | | | | | Course Code: BT24EC2103

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

II B. Tech. I Semester End Examinations

SWITCHING THEORY and LOGIC DESIGN

Time: 3hours **Max.Marks:70**

1. Answer all the questions form Section – A. Each question carries 2 Marks.
2. Answerone question from each unit in section – B. Each question carries 10 Marks.

S. No.		PART – A (Answer All Questions	BTL	CO	M
		20 Marks			
1	a	Convert the following to the required form. i) (A98B)16 = (---------)$_{10}$ ii) (38.65)10 = (----------)$_{2}$.	3	1	2
	b	Express the function Y = A + B'C in canonical SOP?	3	1	2
	c	Simplify the following function using K-map. F(A,B,C,D) = Σ(1,3,4,5,6,11,13,14,15)?	3	2	2
	d	Assess a full adder using two half adders and an OR gate?	3	2	2
	e	Implement the function F =∑m (0, 2) using a 2 × 4 decoder?	3	3	2
	f	Compare PROM, PLA & PAL?	2	3	2
	g	What is the difference between latch and flip flop?	2	4	2
	h	Explain the shift register? List out some applications of Shift Register	2	4	2
	i	Differentiate between Mealy and Moore machine with examples?	2	5	2
	j	Explain the FSM state? List its two basic types.	2	5	2
		PART – B (All Questions Carry Equal Marks)			**50 Marks**
		UNIT – I			**10 Marks**
2	a	Perform subtraction on the following unsigned binary numbers using the 2's complement of the subtrahend (a) (11011)2-(11001)2 (b) (110100)2-(10101)2	3	1	5
	b	Simplify the following function and realize using universal gates F(A,B,C) = A'BC' + ABC + B'C' + A'B'	3	1	5
		OR			
3	a	Perform the following conversions i) FD3.6A to Octal ii) (673.62)8 to decimal iii) (793.75)10 to Hexa decimal	3	1	5
	b	Interpret OR gate and AND gate using NAND gates	3	1	5
		UNIT – II			**10 Marks**
4	a	Design a code converter for BCD to gray code conversion?	4	2	5
	b	Use the K-map method to simplify the following 5-variable function F =∑m (3,6,7,8,10,12,14,17,19,20,21,24,25,27,31)	3	2	5
		OR			
5	a	Explain how a look ahead adder speeds up the addition process. Draw the architecture.	2	2	5
	b	Implement the Boolean function $F = xy' + x'y' + z$ by using NAND gates.	3	2	5
		UNIT – III			**10 Marks**
6	a	Design a priority encoder using logic gates.	4	3	5
	b	Implement the following functions using PLA with three inputs, four	3	3	5

product terms and two outputs. F1 (A, B, C) = ∑m (3, 5, 6, 7), F2 (A, B, C) = ∑m (0, 2, 4, 7).

OR

7	a	Design 32:1 Mux using two 16:1 Muxs and one 2:1 Mux.?	4	3	5
	b	Design a 4 bit comparator circuit using logic gates?	4	3	5

UNIT – IV **10 Marks**

8	a	Convert SR flip – flop to T flip – flop?	3	4	5
	b	Design and explain the working of a synchronous MOD-5 counter?	2	4	5

OR

9	a	Design a 4 bit universal shift register with neat diagram.?	4	4	5
	b	Explain the term Race around condition. How is it satisfied by Master-slave Flip-Flops.?	2	4	5

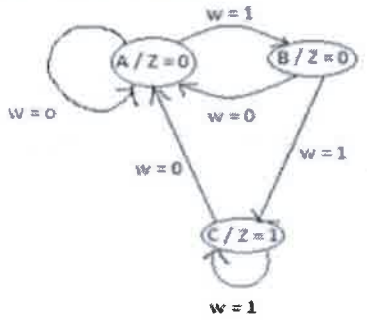
UNIT – V **10 Marks**

10	a	What is meant by state diagram? Define how state assignment is important in a sequential circuit design. Describe with a suitable example.	2	5	5
	b	Convert the following Moore machine into a corresponding Mealy machine:	3	5	5

Present State	Next State		Output
	w=0	w=1	
A	B	C	1
B	D	F	1
C	F	E	0
D	B	G	1
E	F	C	0
F	E	D	0
G	F	E	0

OR

11	a	For the given state diagram, prepare the state table , state assignment and state reduction tables.	3	5	5



	b	Reduce the number of states in the following state table and tabulate the reduced state table shown below:	3	5	5

Present state	Next state		Output	
	x = 0	x = 1	x = 0	x = 1
a	f	b	0	0
b	d	c	0	0
c	f	e	0	0
d	g	a	1	0
e	d	c	0	0
f	f	b	1	1
g	g	h	0	1
h	g	a	1	0

Note: In Part – B, a long answer question may be split into two or three sub questions totaling ten marks or given as a single question worth of ten marks.

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

DR24

H.T.No: | | | | | | | | | | | Course Code: BT24HS2201

D.N.R. COLLEGE OF ENGINEERING &TECHNOLOGY

(AUTONOMOUS)

II B. Tech. Semester End Examinations

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COMMON TO ALL BRANCHES

Time: 3hours **Max.Marks:70**

1. Answer all the questions form Section – A. Each question carries 2 Marks.
2. Answerone question from each unit in section – B. Each question carries 10 Marks.

S. No.		PART – A (Answer All Questions	BTL	CO	M
		20 Marks			
1	a	Define the Managerial Economics.	2	1	2
	b	What is the meaning of Demand?	2	1	2
	c	Differentiate Long run and short run production functions?	3	2	2
	d	What is Break Even Analysis?	2	2	2
	e	What is Oligopoly?	2	3	2
	f	Give an example of sole trader and partnership?	3	3	2
	g	What is working capital?	2	4	2
	h	Define capital budgeting.	1	4	2
	i	Explain about the book keeping?	2	5	2
	j	Define liquidity ratios?	1	5	2
		PART – B (All Questions Carry Equal Marks)			**50 Marks**
		UNIT – I			**10 Marks**
2	a	Define Managerial Economics & Explain nature of Managerial Economics	1	1	5
	b	Explain law of Demand Schedule, Demand curve and its Exceptions	2	1	5
		OR			
3	a	Explain Functions and characteristics of Managerial Economics	2	1	5
	b	Describe Elasticity of Demand. Briefly Explain the Price Elasticity of Demand.	2	1	5
		UNIT – II			**10 Marks**
4	a	Briefly Explain Law of Variable Proportions	2	2	5
	b	Define Production Function & Explain ISO Quant & ISO cost	1	2	5
		OR			
5	a	Define BEA and explain with the help of a graph	1	2	5
	b	Explain Types of Costs	2	2	5
		UNIT – III			**10 Marks**
6	a	Briefly explain about different business firms	2	3	5
	b	What is market structure? Explain the types of markets	2	3	5
		OR			
7	a	What are the features of perfect competition? Explain the perfect and imperfect competition	2	3	5
	b	Define Price. Explain the pricing methods and strategies	1	3	5
		UNIT – IV			**10 Marks**

8	a	Explain the Nature, Functions and Procedure of Capital budgeting	2	4	5
	b	Define Working Capital. Explain the Significance and advantages of Working Capital	1	4	5
		OR			
9		Explain the Techniques of Capital Budgeting	2	4	10
		UNIT – V		**10 Marks**	
10		Define journal, ledger & Trail Blance. Illustrate proforma of Ledger Account?	1	5	10
		OR			
11		Define Financial Accounts. Illustrate proforma of Financial Accounts	1	5	10

Note: In Part – B, a long answer question may be split into two or three sub questions totaling ten marks or given as a single question worth of ten marks.

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H.T.No: | | | | | | | | | | | Course Code: BT24EC2201

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

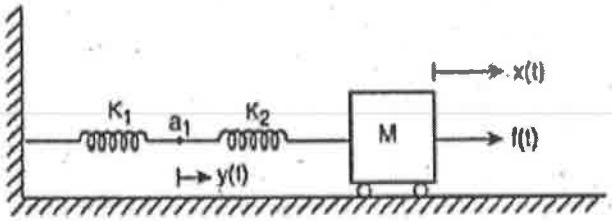
(AUTONOMOUS)

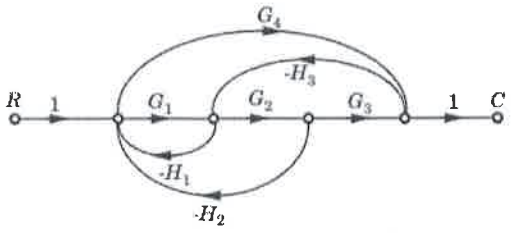
II B. Tech. II Semester End Examinations

LINEAR CONTROL SYSTEMS

Time: 3hours **Max.Marks:70**

1. Answer all the questions form Section – A. Each question carries 2 Marks.
2. Answerone question from each unit in section – B. Each question carries 10 Marks.

S. No.		PART – A (Answer All Questions	BTL	CO	M
		20 Marks			
1	a	Discuss why it is necessary to employ feedback in control systems..	2	1	2
	b	What are the basic elements of rotational system and express with differential equation	2	1	2
	c	List out the advantages of transfer function	2	2	2
	d	Define peak time and rise time	2	2	2
	e	State the necessary and sufficient conditions for stability	2	3	2
	f	Define centroid	2	3	2
	g	Define phase margin and gain margin	2	4	2
	h	Define M and N circles	2	4	2
	i	Give the properties state transition matrix	2	5	2
	j	Define state and state vector	2	5	2
		PART – B (All Questions Carry Equal Marks)			**50 Marks**
		UNIT – I			**10 Marks**
2	a	Define control system, open loop and closed loop control systems. Compare their merits and demerits	2	1	5
	b	Derive the transfer function of Translational Mechanical System	4	1	5
		OR			
3.	a	With necessary equations give the basic elements of a linear mechanical system.	4	1	5
		Determine the differential equation for the given mechanical system as shown in figure and derive its transfer function and also draw the electrical equivalent analogous system.			
	b		3	1	5
		UNIT – II			**10 Marks**
4	a	Draw the transient response of a second order system and define all the specifications for under damped case.	2	2	5
	b	A unity feedback servo-driven instrument has an open loop transfer function: G(s)=10/s(s+2). Find the time domain specification for a unit step input.	3	2	5
		OR			

5	a	Derive the transfer function and develop the block diagram of Armature controlled DC servo motor	4	2	5
		Apply Mason's gain formula to find the transfer function of the system shown below?			
	b		3	2	5
		UNIT – III	**10 Marks**		
6	a	A unity feedback control system has an open loop transfer function Sketch the root locus $G(s) = \frac{K}{s(s^2+4s+13)}$	3	3	5
	b	Construct Routh array and determine the stability of the system represented by the characteristics equation $s^7 + 9s^6 + 24s^4 + 24s^3 + 24s^2 + 23s + 15 = 0$	3	3	5
		OR			
7	a	Define and derive the breakaway point on the root locus.	4	3	5
	b	Test the stability of the system with the following characteristic equation by Routh's test $s^6 + 2s^5 + 8s^4 + 20s^2 + 16s + 16 = 0$	3	3	5
		UNIT – IV	**10 Marks**		
8	a	Explain the design rules of Bode Plot.	2	4	5
	b	Sketch the Bode plot and determine the following. i)Gain cross over frequency ii) Phase cross over frequency (iii) Gain Margin (iv) Phase margin For the transfer function is given by $G(s) = \frac{10}{s(1+0.4s)(1+0.1s)}$	4	4	5
		OR			
9	a	State and explain the Nyquist stability criterion.	4	4	5
	b	Sketch the polar plots of typical Type 0, 1 and 2 systems and explain the salient features of these plots..	4	4	5
		UNIT – V	**10 Marks**		
10	a	Define the controllability and observability.	2	5	5
		Determine the state controllability and observability of the system described by			
	b	$[\dot{X}] = \begin{bmatrix} -3 & 1 & 1 \\ -1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix} x + \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 2 & 1 \end{bmatrix} u;\ y = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix} x$	3	5	5
		OR			
11	a	Define state transition matrix and explain its properties with examples.	2	5	5
	b	Determine the state model of the system characterized by the differential equation $(s^4 + 2s^2 + 8s^3 + 4s + 3)\ Y(s) = 10\ U(s)$	3	5	5

Note: In Part – B, a long answer question may be split into two or three sub questions totaling ten marks or given as a single question worth of ten marks.

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DR24

H.T.No: | | | | | | | | | | | Course Code: BT24EC2202

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

II B. Tech. I Semester End Examinations

ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

Time: 3hours **Max.Marks:70**

1. Answer all the questions form Section – A. Each question carries 2 Marks.
2. Answerone question from each unit in section – B. Each question carries 10 Marks.

S. No.		PART – A (Answer All Questions	20 Marks BTL	CO	M
1	a	State Coulomb Law in electrostatics.	1	1	2
	b	If $D=(2y^2+z)\,a_x$ find ρ_v at (-1,0,3).	2	1	2
	c	Define Relaxation time.	1	2	2
	d	List out the modified time varying Maxwell's equations in a free space?	1	2	2
	e	Define skin Depth?	1	3	2
	f	Define Brewster angle?	1	3	2
	g	Mention the types of transmission lines	1	4	2
	h	Define distortion less line and give the condition for it.	1	4	2
	i	Calculate equivalent electrical length of a Transmission length is $\lambda/4$.	2	5	2
	j	What is Stub Matching?	1	5	2
		PART – B (All Questions Carry Equal Marks)	**50 Marks**		
		UNIT – I	**10 Marks**		
2	a	If a force $F = 2a_x + a_y + a_z$ N is acting on the charge of 10C, find the electric filed intensity, its magnitude and direction.	5	1	5
	b	Derive the relationship between electric field intensity and electric potential.	3	1	5
		OR			
3	a	Derive the expression for capacitance of a coaxial capacitor	3	1	5
	b	Establish Gauss Law in point form and integral form hence deduce Laplace's and Poisson's Equations..	3	1	5
		UNIT – II	**10 Marks**		
4	a	In a certain material, $\mu = \mu o$, $\varepsilon = \varepsilon_o\varepsilon_r$ and $\sigma = 0$. If $H = 10 \sin(108t - 2x)\,a_z$ A/m. determine the J_d and E.	5	2	5
	b	State and explain Ampere's law and also mention its applications	2	2	5
		OR			
5	a	Explain about force on charged particle and current element due to magnetic field.	2	2	5
	b	Explain the concept of Magnetic vector potential	2	2	5
		UNIT – III	**10 Marks**		
6	a	Explain about Total Internal Reflection with necessary equations.	2	3	5
	b	Define Polarization. Explain the various types of polarization.	2	3	5
		OR			
7	a	Discuss about poynting theorem. Write the significance of it.	2	3	5
	b	Find the depth of penetration of an EM wave in copper at f = 60 Hz and f =	5	3	5

100 MHz. For copper, $\sigma = 5.8 \times 107$ mho/m, $\mu_r = 1$, $\epsilon_r = 1$.

		UNIT – IV			**10 Marks**
8	a	A telephone line has R = 40 Ω/m, G = 400 μS/m, L = 0.2 μH/m, C = 0.5 nF/m and operating at f =10MHz. Determine its propagation constant and attenuation constant.	5	4	5
	b	Explain about various transmission line parameters	2	4	5
		OR			
9	a	List out the various transmission lines. Write the applications of transmission lines.	2	4	5
	b	The constants per km of a certain cable are: R = 6.75ohms; L = 5.5mH; C = 0.00872 μF and G = 0.4 μmhos. Calculate the Characteristic impedance, attenuation constant and phase velocity when ω = 5000 radians per second.	5	4	5
		UNIT – V			**10 Marks**
10	a	Define input impedance of a transmission line and derive the expression for it.	2	5	5
	b	Explain about single stub matching	2	5	5
		OR			
11	a	List out the advantages and applications of smith chart.	2	5	5
	b	Derive the expression for input impedance of open circuited and short-circuited transmission lines.	2	5	5

Note: In Part – B, a long answer question may be split into two or three sub questions totaling ten marks or given as a single question worth of ten marks.

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H.T.No: | | | | | | | | | | | Course Code: BT24EC2203

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

II B. Tech. I Semester End Examinations

ELECTRONIC CIRCUIT ANALYSIS

Time: 3hours **Max.Marks:70**

1. Answer all the questions form Section – A. Each question carries 2 Marks.
2. Answerone question from each unit in section – B. Each question carries 10 Marks.

S. No.		PART – A (Answer All Questions	BTL	CO	M
		20 Marks			
1	a	Write a short note on hybrid-π capacitances.	1	1	2
	b	Explain Base spread resistance (r_{bb}')	1	1	2
	c	Three amplifiers of gain 10dB, 20dB and 30dB are connected together. Find the overall gain in dB and in normal units.	1	2	2
	d	List the features of Darlington pair amplifier.	1	2	2
	e	Show that the input resistance increases with series mixing.	1	3	2
	f	Write advantages of negative feedback in amplifier?	1	3	2
	g	Classify different types of oscillator.	1	4	2
	h	Explain why RC Phase shift oscillators are not used at high frequencies.	1	4	2
	i	What are the advantages of push pull power amplifiers.	1	5	2
	j	) What is staggering?	1	5	2
		PART – B (All Questions Carry Equal Marks)	**50 Marks**		
		UNIT – I	**10 Marks**		
2		Draw the High frequency model of a Transistor. Derive the relationship between high frequency and low frequency parameters.	3	1	10
		OR			
3	a	Find the voltage gain, input and output resistances of a emitter follower at high frequencies.	3	1	5
	b	A common source amplifier uses a MOSFET with the following parameters gm=1.5mA/V, rd=40kohms, Cgs=3pF, Cds=1pF, Cgd=3.2pF. The value of Rd=200Kohms. The amplifier operates at 30KHz. Find Voltage gain, input resistance, output resistance and input capacitance	3	1	5
		UNIT – II	**10 Marks**		
4	a	With a neat circuit diagram. Explain about Boo-Strap emitter follower amplifier?	3	2	5
	b	Show that band width decreases with cascading	3	2	5
		OR			
5	a	What is fidelity of an Amplifier? Explain about Frequency response of an amplifier by considering different frequency regions	2	2	5
	b	Derive an expression for the lower 3dB frequency of an RC coupled amplifier by taking the effect of emitter bypass capacitor into account.	2	2	5
		UNIT – III	**10 Marks**		
6	a	With a neat sketch explain a negative feedback amplifier and obtain expression for its closed loop gain.	3	3	5

	b	If an input of 0.028V peak to peak given to an open loop amplifier, it gives fundamental frequency output of 36V peak to peak, but it is associated with 7% distortion. i) If the distortion is to be reduced to 1%, how much feedback is to be introduced and what will be required input voltage? ii) If 1.2% of output is feedback and the input is maintained at the same level, what is the output voltage?	3	3	5
		OR			
7	a	Give the block diagram of a general feedback amplifier. State the function of each block.	2	3	5
	b	Discuss about frequency and amplitude stability of oscillators.	3	3	5
		UNIT – IV			**10 Marks**
8	a	Derive the expression for frequency of oscillation and condition for sustained oscillation of a Hartley oscillator.	3	4	5
	b	Explain the limitations of RC phase shift oscillator.	2	4	5
		OR			
9		Draw the circuit diagram of a FET based RC phase shift oscillator and derive the expression for frequency of oscillation and condition for sustained oscillations.	3	5	10
		UNIT – V			**10 Marks**
10	a	Draw the circuit diagram of a class A transformer coupled amplifier and derive an expression for it's conversion efficiency.	3	5	5
	b	In an Ideal Class B push pull amplifier, VCC=20V, N2=2N1 and RL=20 ohms. Find the output signal power, P0max and collector dissipation in each Transistor, PC under full power condition, Find PCmax also.	3	5	5
		OR			
11	a	Explain the operation of a single tuned amplifier circuit and its frequency Response.	2	6	8
	b	Define Q factor.	2	6	2

Note: In Part – B, a long answer question may be split into two or three sub questions totaling ten marks or given as a single question worth of ten marks.

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DR24

H.T.No: | | | | | | | | | | | Course Code: BT24EC2204

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

II B. Tech. I Semester End Examinations

ANALOG COMMUNICATION

Time: 3hours **Max.Marks:70**

1. Answer all the questions form Section – A. Each question carries 2 Marks.
2. Answerone question from each unit in section – B. Each question carries 10 Marks.

S. No.		PART – A (Answer All Questions	BTL	CO	M
		20 Marks			
1	a	Write the applications of Fourier transform?	1	1	2
	b	Explain need for modulation?	1	1	2
	c	What is quadrature null effect	1	2	2
	d	Comparison and contrast different AM Techniques	1	2	2
	e	What is the bandwidth required for an FM wave in which the Modulating frequency signal is 2 kHz and the maximum frequency deviation is 12 kHz?	1	3	2
	f	Differentiate between phase and frequency modulation.	2	3	2
	g	What are the advantages of Super heterodyne receiver over Tuned radio frequency receiver?	1	4	2
	h	Write short notes on a) fidelity b) sensitivity c) selectivity	1	4	2
	i	What is thermal noise?	1	5	2
	j	Explain PAM, PWM and PPM?	1	5	2
		PART – B (All Questions Carry Equal Marks)			**50 Marks**
		UNIT – I			**10 Marks**
2	a	What is the principle of Amplitude modulation? Derive expression for the AM wave and draw its spectrum	3	1	5
	b	A modulating signal of 2 cos5000t is amplitude modulated over a carrier signal of 5cos20000t. Find the modulation index, LSB and USB frequencies, bandwidth and the ratio of Side Band Power to the Total Power of AM wave..	3	1	5
		OR			
3	a	When a signal m(t) = 3 cos (2π x 103t) modulates a carrier c(t) = 5 cos (x 106t),find the modulation index and transmission bandwidth if the modulation is AM.	3	1	5
	b	Explain the Square law method of demodulating an AM wave	3	1	5
		UNIT – II			**10 Marks**
4	a	Explain the generation of DSB-SC signal using balanced modulator. Derive the expression for DSB-SC signal	2	2	5
	b	A carrier signal c (t) = 10 Cos ($2\pi.10^6$ t) is modulated by a message signal m (t) = 2 Cos ($8\pi.10^3$ t) to generate a DSB-SC signal. Sketch the spectrum, calculate the B.W and power	3	2	5
		OR			
5	a	Explain the generation of SSB signal using balanced modulator and phase shifter	2	2	5
	b	Obtain a relationship between carrier and side band powers in an SSBSC	2	2	5

		wave and explain how power distribution takes place in SSB SC system			
		UNIT – III	**10 Marks**		
6	a	Explain Armstrong method of generation of FM signal	3	3	5
	b	Distinguish between FM and PM by giving its mathematical analysis	3	3	5
		OR			
7		An FM signal is represented in time domain as s (t) = 10 Cos ($2\pi.10^6$ t + 5 Sin $8\pi.10^3$ t). Calculate the frequency deviation, modulation index, power and band width.	2	3	10
		UNIT – IV	**10 Marks**		
8		Explain about AM Radio Receiver and super heterodyne receiver with neat sketch	3	4	10
		OR			
9		What is AGC? Draw and explain a simple AGC circuit and also explain different types of AGC.	3	5	10
		UNIT – V	**10 Marks**		
10		Discuss in detail the following thermal noise shot noise noise figure equivalent noise temperature	3	5	10
		OR			
11	a	With a neat sketch explain the generation of PPM from PWM.	2	6	5
	b	Compare merits and demerits of TDM and FDM.	2	6	5

Note: In Part – B, a long answer question may be split into two or three sub questions totaling ten marks or given as a single question worth of ten marks.

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Department of ECE
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BHIMAVARAM-534 202

DR24

ENGINEERING CURRICULUM

M.Tech. Two Years Degree Program

(DR24 M.Tech. III & IV Semester Syllabus)

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

Accredited with A++ Grade by NAAC & Accredited by NBA (B.Tech.–CSE, ECE & EEE)

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

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

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D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)
BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SEMESTER - I							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
1	MT24DE1101	**Program Core-1** Digital System Design	PC	3	0	0	3
2	MT24DE1102	**Program Core-2** Digital Data Communications	PC	3	0	0	3
Program Elective-1							
3	MT24DE1103	Transform Techniques	PE	3	0	0	3
	MT24DE1104	VLSI Technology and Design	PE	3	0	0	3
	MT24DE1105	Radar Signal Processing	PE	3	0	0	3
Program Elective-2							
4	MT24DE1106	Statistical Signal Processing	PE	3	0	0	3
	MT24DE1107	Optical Communication Technology	PE	3	0	0	3
	MT24DE1108	Network Security& Cryptography	PE	3	0	0	3
6	MT24DE1109	**Laboratory-1** System Design Using Verilog HDL Laboratory	LB	0	0	4	2
7	MT24DE1110	**Laboratory-2** Data Communications Laboratory	LB	0	0	4	2
5	MT24DE1111	**Research Methodology and IPR**	CC	2	0	0	2
8	MT24DE1112	**Audit Course 1***	AC	2	0	0	0
Total Credits							**18**

Student has to choose anyone Audit Course listed below.

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D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)
BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SEMESTER - II							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
1	MT24DE1201	**Program Core-3** Image and Video Processing	PC	3	0	0	3
2	MT24DE1202	**Program Core-4** Wireless Communications and Networks	PC	3	0	0	3
Program Elective-3							
3	MT24DE1203	CMOS Analog & Digital IC Design	PE	3	0	0	3
	MT24DE1204	Advanced Computer Architecture	PE	3	0	0	3
	MT24DE1205	Soft Computing Techniques	PE	3	0	0	3
ProgramElective-4							
4	MT24DE1206	DSP Processors and Architectures	PE	3	0	0	3
	MT24DE1207	EMI/ EMC	PE	3	0	0	3
	MT24DE1208	Object Oriented Programming	PE	3	0	0	3
5	MT24DE1209	**Laboratory-3** Advanced Communications Laboratory	LB	0	0	4	2
6	MT24DE1210	**Laboartory-4** Advanced Digital Image &Video Processing Laboratory	LB	0	0	4	2
7	MT24DE1211	**Mini Project**	MP	2	0	0	2
8	MT24DE1212	**Audit Course-2***	AC	2	0	0	0
Total Credits							**18**

Student has to choose anyone audit course listed below.

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Department of ECE
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D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)
BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SEMESTER - III							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
		Program Elective-5					
1	MT24DE2101	Detection & Estimation Theory	PE	3	0	0	3
	MT24DE2102	Advanced Digital Signal Processing	PE	3	0	0	3
	MT24DE2103	Coding Theory and Applications	PE	3	0	0	3
		Open Elective					
2	MT24DE2104	Business Analytics	OE	3	0	0	3
	MT24DE2105	Industrial Safety	OE	3	0	0	3
	MT24DE2106	Operations Research	OE	3	0	0	3
	MT24DE2107	Cost Management of Engineering Projects	OE	3	0	0	3
	MT24DE2108	Composite Materials	OE	3	0	0	3
	MT24DE2109	Waste to Energy	OE	3	0	0	3
3	MT24DE21110	**Dissertation Phase–I**	PJ	0	0	20	10
Total Credits							16

SEMESTER - IV							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
1	MT24DE2201	**Dissertation Phase–II**	PJ	0	0	32	16
Total Credits							16

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

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1101	L	T	P	C
		3	0	0	3
DIGITAL SYSTEM DESIGN (PROGRAM CORE – I)					

Course objectives:

The main objectives of this course are given below:

- The basic concepts of K-map, tabular method, QM method are revised and higher order minimization.1 techniques like CAMP algorithm and Cubical operations are explained.
- PLA folding using COMPACT algorithms studied for various cases.
- ASM charts are revised and design techniques of digital circuit realization are explained.
- Digital system design is approached using CPLD, FPGA and ASIC.
- Fault Diagnosis in Combinational Circuits are performed using various techniques like fault detection test, path sensitization method and Boolean difference method, Kohavi algorithm.
- Fault Diagnosis in sequential circuits is performed using Circuit test approach, Hamming Experiments, synchronizing experiments, distinguishing and adaptive distinguishing experiments on different cases.

Course outcomes:

At the end of this course the student can able to:

- Understand the basic concepts of a Karnaugh Map ("K-map") for a 2-, 3-, 4-, or 5-variable logic function and to identify the prime implicates, essential prime implicates, and nonessential prime implicates of a function depicted on a K-map.
- Perform the minimization of a Boolean function using tabular method, QM algorithm and CAMP algorithm and determine the Adjacencies, DA, CSC, SSMs, EPCs and SPCs.
- Perform the minimization of PLA using IISc algorithm and folding using COMPACT algorithm.
- Can design a digital circuit by steps involving ASM chart.
- Understand the digital system design approaches using CPLDs, FPGAs and ASICs.
- Rectify a single fault and multiple faults in combinational circuits using Path sensitization method, Boolean difference method and Kohavi algorithm.
- Perform fault diagnosis in sequential circuits.

UNIT-I:

Minimization Procedures and CAMP Algorithm: Review on minimization of switching functions using tabular methods, k-map, QM algorithm, CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs,, CAMP-I algorithm, Phase-II: Passport checking, Determination of SPC, CAMP-II algorithm: Determination of solution

cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT-II:

PLA Design, Minimization and Folding Algorithms: Introduction to PLDs, basic configurations and advantages of PLDs, PLA-Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm(IISc algorithm), PLA folding algorithm(COMPACT algorithm)-Illustration of algorithms with suitable examples.

UNIT -III:

Design of Large Scale Digital Systems: Algorithmic state machine charts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design, PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT-IV:

Fault Diagnosis in Combinational Circuits: Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods- Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built in self-test.

UNIT-V:

Fault Diagnosis in Sequential Circuits: Fault detection and location in sequential circuits, circuit test approach, initial state identification, Haming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

TEXT BOOKS:

1. Logic Design Theory-N. N. Biswas, PHI
2. Switching and Finite Automata Theory-Z. Kohavi , 2 nd Edition, 2001, TMH
3. Digital system Design using PLDd-Lala

REFERENCE BOOKS:

1. Fundamentals of Logic Design – Charles H. Roth, 5 th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1102	L	T	P	C
		3	0	0	3
DIGITAL DATA COMMUNICATIONS (PROGRAM CORE – II)					

Course objectives:

- The main objectives of this subject are:
- Different modulation techniques to improve the bandwidth and their properties.
- Networking and different protocol systems.
- Error estimation and correction, asynchronous and synchronous protocols.
- Multiplexing techniques, different networking connections and interfacing devices.
- Multiple access techniques and analysis.

Course outcomes:

At the end of this course the student can able to:

- Model digital communication system using appropriate mathematical techniques (error probability, constellation diagrams, pharos diagrams).
- Understanding the basic concepts of how digital data is transferred across computer networks.
- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of sub netting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used
- To assist in network design and implementation.

UNIT -I:

Digital Modulation Schemes: BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

UNIT -II:

Basic Concepts of Data Communications, Interfaces and Modems: Data Communication Networks, Protocols and Standards, UART, USB, Line Configuration, Topology, Transmission Modes, Digital Data Transmission, DTE-DCE interface, Categories of Networks – TCP/IP Protocol suite and Comparison with OSI model.

UNIT -III:

Error Correction: Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code Data Link Control: Line Discipline, Flow Control, Error Control Data Link Protocols: Asynchronous Protocols, Synch

UNIT -IV:

Multiplexing: Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, DSL. Local Area Networks: Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI. Metropolitan Area Networks: IEEE 802.6, SMDS Switching: Circuit Switching, Packet Switching, Message Switching. Networking and Interfacing Devices: Repeaters, Bridges, Routers, Gateway, Other Devices.

UNIT -V:

Multiple Access Techniques: Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA), OFDM and OFDMA. Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization.

TEXT BOOKS:

1. Data Communication and Computer Networking - B. A.Forouzan, 2 nd Ed., 2003, TMH.
2. Advanced Electronic Communication Systems - W. Tomasi, 5 th E d., 2008, PEI.

REFERENCE BOOKS:

1. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI.
2. Data and Computer Communications - William Stallings, 8 th Ed., 2007, PHI.
3. Data Communication and Tele Processing Systems -T. Housely, 2nd Ed, 2008, BSP.
4. Data Communications and Computer Networks- Brijendra Singh, 2 ndEd., 2005, PHI.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1103	L	T	P	C
		3	0	0	3
TRANSFORM TECHNIQUES (PROGRAM ELECTIVE – I)					

Course Outcomes:

On completion of this course student will be able to:

- The student will learn basics of two-dimensional transforms.
- Understand the definition, properties and applications of various two-dimensional transform.
- Understand the basic concepts of wavelet transform.
- Understand the special topics such as wavelet packets, Bi-orthogonal wavelets e.t.c.

UNIT -I:

Fourier Analysis: Fourier series, Examples, Fourier Transform, Properties of Fourier Transform, Examples of Fourier transform, sampling theorem, Partial sum and Gibbs phenomenon, Fourier analysis of Discrete time Signals, Discrete Fourier Transform. Time – Frequency Analysis: Window function, Short Time Fourier Transform, Discrete Short Time Fourier Transform, Continuous wavelet transform, Discrete wavelet transform, wavelet series, Interpretations of the Time-Frequency plot.

UNIT -II:

Transforms: Walsh, Hadamard, Haar and Slant Transforms, DCT, DST, KLT, Singular value Decomposition – definition, properties and applications

UNIT -III:

Continuous Wavelet Transform (CWT): Short comings of STFT, Need for wavelets, Wavelet Basis- Concept of Scale and its relation with frequency, Continuous time wavelet Transform Equation- Series Expansion using Wavelets- CWTTiling of time scale plane for CWT. Important Wavelets: Haar, Mexican Hat, Meyer, Shannon, Daubechies.

UNIT -IV:

Multi Rate Analysis and DWT: Need for Scaling function – Multi Resolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks and Wavelet Basis, DWT, Structure of DWT Filter Banks, Daubechies Wavelet Function, Applications of DWT.

UNIT -V:

Wavelet Packets and Lifting: Wavelet Packet Transform, Wavelet packet algorithms, Thresholding Hard thresholding, Soft thresholding, Multidimensional Wavelets, Bi-orthogonal basis- B-Splines, Lifting Scheme of Wavelet Generation, Multi Wavelets

TEXT BOOKS:

1. A Wavelet Tour of Signal Processing theory and applications -RaghuveerM.Rao and Ajit S. Bopardikar, Pearson Edu, Asia, New Delhi, 2003.
2. K.P.Soman and K.I Ramachandran, " Insight into Wavelets – from theory to practice" PHI, Second edition,2008

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1104	L	T	P	C
		3	0	0	3
VLSI TECHNOLOGY AND DESIGN (PROGRAM ELECTIVE – I)					

Course Outcomes

- Review of FET fundamentals for VLSI design.
- To acquires knowledge about stick diagrams and layouts.
- Enable to design the subsystems based on VLSI concepts.

UNIT-I:

VLSI Technology: Fundamentals and applications, IC production process, semiconductor processes, design rules and process parameters, layout techniques and process parameters. VLSI Design: Electronic design automation concept, ASIC and FPGA design flows, SOC designs, design technologies: combinational design techniques, sequential design techniques, state machine logic design techniques and design issues.

UNIT-II:

CMOS VLSI Design: MOSTechnology and fabrication process of pMOS, nMOS, CMOS and BiCMOS technologies, comparison of different processes. Building Blocks of a VLSI circuit: Computer architecture, memory architectures, communication interfaces, mixed signal interfaces. VLSI Design Issues: Design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design.

UNIT-III:

Basic electrical properties of MOS and BiCMOS circuits, MOS and BiCMOS circuit design processes, Basic circuit concepts, scaling of MOS circuits-qualitatitive and quantitative analysis with proper illustrations and necessary derivations of expressions.

UNIT-IV:

Subsystem Design and Layout: Some architectural issues, switch logic, gate logic, examples of structured design (combinational logic), some clocked sequential circuits, other system considerations. Subsystem Design Processes: Some general considerations and an illustration of design processes, design of an ALU subsystem.

UNIT-V:

Floor Planning: Introduction, Floor planning methods, off-chip connections. Architecture Design: Introduction, Register-Transfer design, high-level synthesis, architectures for low power, architecture testing. Chip Design: Introduction and design methodologies.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian, Douglas A. Pucknell, SholehEshraghian, 2005, PHI Publications.
2. Modern VLSI Design-Wayne Wolf, 3 rd Ed., 1997, Pearson Education.
3. VLSI Design-Dr.K.V.K.K.Prasad, KattulaShyamala, Kogent Learning Solutions Inc., 2012.

REFERENCE BOOKS:

1. VLSI Design Technologies for Analog and Digital Circuits, Randall L.Geiger, Phillip E.Allen, Noel R.Strader, TMH Publications, 2010.
2. Introduction to VLSI Systems: A Logic, Circuit and System Perspective- Ming-BO Lin, CRC Press, 2011.
3. Principals of CMOS VLSI Design-N.H.E Weste, K. Eshraghian, 2 nd Edition, Addison Wesley.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1105	L	T	P	C
		3	0	0	3
RADAR SIGNAL PROCESSING (PROGRAM ELECTIVE – I)					

Core Objectives:

The main objectives of this subject are:

- Derivation of Radar range and Design of matched filter for different noises.
- Signal detection techniques at receiver.
- Optimum Radar Waveforms for Detection of signals in Clutter and various Families.
- The characteristics of a Linear pulse and digital compression to Radar signals.
- The principles of different phase coding techniques and analysis.

Core Outcomes:

At the end of this course the student can able to:

- Understand the operation of Radar and characteristics of Matched filter for non-white noise.
- Understand the various detection criterion and types of detectors that can be used to detect the Radar signals in noise.
- Understand the waveform design requirements and optimum waveforms for the detection of signals in clutter.
- Know the significance and types of pulse compression techniques for analog and digital signals.
- Understand the requirements of phase coding in Radar and various poly phase codes used for phase coding.

UNIT -I:

Introduction: Radar Block Diagram, Bi-static Radar, Monostatic Radar, Radar Equation, Information Available from Radar Echo. Review of Radar Range Performance– General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, MTI and Pulse Doppler Radar. Matched Filter Receiver – Impulse Response, Frequency Response Characteristic and its Derivation, Matched Filter and Correlation Function, Correlation Detection and Cross-Correlation Receiver, Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise.

UNIT -II:

Detection of Radar Signals in Noise: Detection Criteria – Neyman-Pearson Observer, Likelihood-Ratio Receiver, Inverse Probability Receiver, Sequential Observer, Detectors– Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection-CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar. Radar Signal Management–Schematics, Component Parts, Resources and Constraints.

UNIT -III:

Waveform Selection [3, 2]: Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases – Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise Like Waveforms, Waveform Design Requirements, Optimum Waveforms for Detection in Clutter, Family of Radar Waveforms.

UNIT -IV:

Pulse Compression in Radar Signals: Introduction, Significance, Types, Linear FM Pulse Compression – Block Diagram, Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression, SAW Pulse Compression.

UNIT V:

Phase Coding Techniques: Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar. Poly Phase Codes : Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Side lobe Reduction for Phase Coded PC Signals.

TEXT BOOKS:

1. Radar Handbook - M.I. Skolnik, 2 nd Ed., 1991, McGraw Hill.
2. Radar Design Principles : Signal Processing and The Environment - Fred E. Nathanson, 2nd Ed., 1999, PHI.
3. Introduction to Radar Systems - M.I. Skolnik, 3 rd Ed., 2001, TMH.

REFERENCE BOOKS:

1. Radar Principles - Peyton Z. Peebles, Jr., 2004, John Wiley.
2. Radar Signal Processing and Adaptive Systems - R. Nitzberg, 1999, Artech House.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1106	L	T	P	C
		3	0	0	3
STATISTICALSIGNALPROCESSING (PROGRAM ELECTIVE - II)					

Course Outcomes:

- Analyse signals and develop their statistical models for efficient processing
- Formulate filtering problems from real life applications and design filtering solutions to estimate a desired signal from a given mixture by minimizing a cost function
- Design and analyse efficient algorithms for estimation of various parameters of signals with different constraints
- Develop efficient methods for spectrum and frequency estimation suiting the requirements derived from practical problems

UNIT I

Signal models and characterization: Types and properties of statistical models for signals and how they relate to signal processing, Common second-order methods of characterizing signals including auto correlation,partial correlation, cross-correlation, power spectral density and cross-power spectral density.

UNIT II

Spectral estimation: Nonparametric methods for estimation of power spectral density, auto-correleation, cross-correlation, transfer functions, and coherence form finite signal samples.

UNIT III

Review of signal processing: A review on random processes, A review on filtering random processes, Examples. Statistical parameter estimation: Maximum likehood estimation, maximum a posterior stimation, Cramer-Rao bound.

UNIT IV

Eigen structure based frequency estimation: Pisarenko, MUSIC, ESPRIT their application sensor array direction finding. Spectrum estimation: Moving average (MA), Auto Regressive (AR), Auto Regressive Moving Average (ARMA), Various non-parametric approaches.

UNIT V

Wiener filtering: The finite impulse case, causal and non-causal infinite impulse responses cases, Least mean squares adaptation, recursive least squares adaptation, Kalman filtering.

TEXT BOOKS:

1. Steven M.Kay, fundamentals of statistical signal processing: estimation Theory, PreticeHall, 1993.
2. Monsoon H. Hayes, Statically digital signal processing and modeling, USA, Wiley,1996.

REFERENCEBOOKS:

1. Dimitris G.Manolakis, Vinay K. Ingle, and Stephen M. Kogon, Statistical and adaptive signal processing, Artech House, Inc,2005, ISBN 1580536107

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1107	L	T	P	C
		3	0	0	3
OPTICAL COMMUNICATION TECHNOLOGY (PROGRAM ELECTIVE -II)					

Course Objectives

- To expose the students to the basics of signal propagation through optical fibers , fiber impairments students should be familiar with commonly used components and subsystems in optical communication and network systems
- To know the Optical Modulation and demodulation and Error Detection and Correction codes.
- Learn about optical amplifier Transmission system model, power penalty-transmitter, power penalty-transmitter, receiver Scope – receiver optical amplifiers, crosstalk, dispersion
- Learn about necessity of wavelength division multiplexing (WDM), working principle and techniques of multiplexing, and Overall System Design considerations and optical networks

Course outcomes

At the end of this course the student can able to:

- Able to analyze characteristics of optical fiber and signal propagation through optical fibers.
- Know the commonly used components and subsystems in optical communication and network.
- systems ,Working principle of optical communication components ,amplifiers, filters
- Able to analyze Transmission system model
- Understand the importance of wavelength division multiplexing (WDM) and de-multiplexing,

UNIT –I:

Signal propagation in Optical Fibers: Geometrical Optics approach and Wave Theory approach, Loss and Bandwidth, Chromatic Dispersion, Non Linear effects- Stimulated Brillouin and Stimulated Raman Scattering, Propagation in a Non-Linear Medium, Self-Phase Modulation and Cross Phase Modulation, Four Wave Mixing, Principle of Solitons.

UNIT –II:

Fiber Optic Components for Communication & Networking: Couplers, Isolators and Circulators, Multiplexers, Bragg Gratings, Fabry-Perot Filters, Mach Zender Interferometers, Arrayed Waveguide Grating, Tunable Filters, High Channel Count Multiplexer Architectures, Optical Amplifiers, Direct and External Modulation Transmitters, Pump Sources for Amplifiers, Optical Switches and Wavelength Converters.

UNIT –III:

Modulation and Demodulation: Signal formats for Modulation, Subcarrier Modulation and Multiplexing, Optical Modulations – Duobinary, Single Side Band and Multilevel Schemes, Ideal and Practical receivers for Demodulation, Bit Error Rates, Timing Recovery and Equalization, Reed-Solomon Codes for Error Detection and Correction.

UNIT -IV:

Transmission System Engineering: System Model, Power Penalty in Transmitter and Receiver, Optical Amplifiers, Crosstalk and Reduction of Crosstalk, Cascaded Filters, Dispersion Limitations and Compensation Techniques.

UNIT –V:

Fiber Non-linearities and System Design Considerations: Limitation in High Speed and WDM Systems due to Non-linearities in Fibers, Wavelength Stabilization against Temperature Variations, Overall System Design considerations – Fiber Dispersion, Modulation, Non-Linear Effects, Wavelengths, All Optical Networks.

TEXT BOOKS:

1. Optical Networks: A Practical Perspective - Rajiv Ramaswami and Kumar N. Sivarajan, 2 nd Ed., 2004, Elsevier Morgan Kaufmann Publishers (An Imprint of Elsevier).
2. Optical Fiber Communications – Gerd Keiser, 3 rd Ed., 2000, McGraw Hill.

REFERENCE BOOKS:

1. Optical Fiber Communications: Principles and Practice – John.M.Senior, 2nd Ed., 2000, PE.
2. Fiber Optics Communication – Harold Kolimbris, 2nd Ed., 2004, PEI
3. Optical Networks: Third Generation Transport Systems – Uyless Black, 2 nd Ed., 2009, PEI
4. Optical Fiber Communications – Govind Agarwal, 2nd Ed., 2004, TMH.
5. Optical Fiber Communications and Its Applications – S.C.Gupta, 2004, PHI.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1108	L	T	P	C
		3	0	0	3
NETWORK SECURITY AND CRYPTOGRAPHY (PROGRAM ELECTIVE -II)					

Course Outcomes:

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

- Identify and utilize different forms of cryptography techniques.
- Incorporate authentication and security in the network applications.
- Distinguish among different types of threats to the system and handle the same.

UNIT -I:

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

UNIT -II:

Encryption Algorithms: Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block cifers.Conventional Encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT -III:

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptograpy. Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat"s and Euler"s theorems, Testing for primality, Euclid"s Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT -IV:

Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.Hash and Mac Algorithms MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards. Authentication Applications : Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT –V:

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management. Web Security: Web Security requirements, secure sockets layer and Transport layer security, Secure Electronic Transaction. Intruders, Viruses and Worms Intruders, Viruses and Related threats. Fire Walls: Fire wall Design Principles, Trusted systems.

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice - William Stallings, Pearson Education.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Principles of Information Security, Whitman, Thomson.
4. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
5. Introduction to Cryptography, Buchmann, Springer.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1111	L	T	P	C
		2	0	0	2
RESEARCH METHODOLOGY AND IPR					

Course Outcomes:

At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today"s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

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,

Unit 3:

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 4:

Nature of Intellectual Property: Patents, Designs, Trademarks 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 5:

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. Unit 6: 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 ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1109	L	T	P	C
		0	0	4	2
SYSTEM DESIGN USING VERILOG HDL LABORATORY					

Course Outcomes:

At the end of the laboratory work, students will be able to:

- Identify, formulate, solve and implement problems in signal processing, communication systems etc using RTL design tools.
- Use EDA tools like Cadence, Mentor Graphics and Xilinx.

List of Experiments:

1) Verilog implementation of 8:1 Mux/Demux, Full Adder, 8-bit Magnitude comparator, Encoder/decoder, Priority encoder, D-FF, 4-bit Shift registers (SISO, SIPO, PISO, bidirectional), 3-bit Synchronous Counters, Binary to Gray converter, Parity generator.
2) Sequence generator/detectors, Synchronous FSM – Mealy and Moore machines.
3) Vending machines - Traffic Light controller, ATM, elevator control.
4) PCI Bus & arbiter and downloading on FPGA.
5) UART/ USART implementation in Verilog.
6) Realization of single port SRAM in Verilog.
7) Verilog implementation of Arithmetic circuits like serial adder/ subtractor, parallel adder/subtractor, serial/parallel multiplier.
8) Discrete Fourier transform/Fast Fourier Transform algorithm in Verilog

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1110	L	T	P	C
		0	0	4	2
DATA COMMUNICATIONS LAB					

List of Experiments:

1) Study of serial interface RS – 232
2) Study of pc to pc communication using parallel port
3) To establish pc-pc communication using LAN
4) Study of LAN using star topology, bus topology and tree topology
5) Study and configure modem of a computer
6) To configure a hub/switch
7) To study the interconnections of cables for data communication
8) Study of a wireless communication system
9) Set up of time division multiplexing using fiber optics
10) Digital Fiber Optical Transmitter and Receiver

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

I Semester	Course Code: MT24DE1112	L	T	P	C
		2	0	0	0
ENGLISH FOR RESEARCH PAPER WRITING AUDIT 1					

Course objectives:

Students will be able to:

Understand that how to improve your writing skills and level of readability

Learn about what to write in each section

Understand the skills needed when writing a Title Ensure the good quality of paper at very first time submission.

Syllabus:

UNITS	CONTENTS	Hours
1	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	4
4	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,	4
5	skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	4
6	useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press Highman N (1998),
3. Handbook of Writing for the Mathematical Sciences, SIAM. Highman"sbook .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1201	L	T	P	C
		3	0	0	3
IMAGE AND VIDEO PROCESSING (PROGRAM CORE - III)					

Course Objectives:

- The basic concepts and methods to develop foundation in digital image processing and video processing are introduced and The Importance of various image transforms, image transform properties are discussed. .
- Understanding the image enhancement techniques in both spatial domain and frequency domain.
- The process of recovering image that has been degraded by noise or any other degradation phenomenon.
- Understanding the importance of image segmentation and various methods used for segmentation, The importance of reducing the data for digital image representation by using various image compression techniques .
- To understand the importance of video processing in multimedia and the various video formation models, motion estimation techniques in video processing .
- Applications of motion estimation in video processing

Course Outcomes

- Know digital image, representation of digital image, importance of image resolution, applications in image processing, the advantages of representation of digital images in transform domain, application of various image transforms. Understand and analyze the image enhancement and image degradation, image restoration techniques using spatial filters and frequency domain.
- Understand and analyze the detection of point, line and edges in images, edge linking and various segmentation techniques and the redundancy in images, various image compression techniques.
- Describe the video technology from analog color TV systems to digital video systems, how video signal is sampled and filtering operations in video processing.
- Describe the general methodologies for 2D motion estimation, various coding used in video processing.

UNIT –I:

Fundamentals of Image Processing and Image Transforms: Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing Introduction, Need for transform, image transforms, Fourier transform, 2 D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar transform, slant transform Discrete

cosine transform, KL transform, singular value decomposition, Radon transform, comparison of different image transforms.

UNIT –II:

Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering. Image Restoration: Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind de-convolution.

UNIT –III:

Image Segmentation: Introduction to image segmentation, Point, Line and Edge Detection, Region based segmentation., Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge based segmentation, Edge detection and linking, Hough transform, Active contour.

Image Compression: Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon – Fano coding, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standard Wavelet-based image compression, JPEG Standards.

UNIT -IV:

Basic Steps of Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT –V:

2-D Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

TEXT BOOKS:

1. Digital Image Processing – Gonzaleze and Woods, 3 rd Ed., Pearson.
2. Video Processing and Communication – Yao Wang, JoemOstermann and Ya–quin Zhang. 1 st Ed., PH Int.
3. S.Jayaraman, S.Esakkirajan and T.VeeraKumar, "Digital Image processing, Tata McGraw Hill publishers, 2009

REFRENCE BOOKS:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with CVIP Tools – Scotte Umbaugh, 2nd Ed, CRC Press, 2011.
2. Digital Video Processing – M. Tekalp, Prentice Hall International.
3. Multi dimensional Signal, Image and Video Processing and Coding – John Woods, 2nd Ed, Elsevier.
4. Digital Image Processing with MATLAB and Lab view – Vipula Singh, Elsevier. 5. Video Demystified – A Hand Book for the Digital Engineer – Keith Jack, 5th Ed., Elsevier.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1202	L	T	P	C
		3	0	0	3
WIRELESS COMMUNICATIONS AND NETWORKS (PROGRAM CORE - IV)					

OBJECTIVES:

- The Aim of this course is to introduce the fundamental technologies for wireless communications and networking.
- It introduces the Key concepts of Cellular and Mobile communications.
- Introducing the concepts of Multiple Access Schemes.
- Introducing the important concepts of Wireless networking, WLAN, WLL, IEEE 802 standards.

Course Outcomes:

At the end of this course, students will be able to

- Understand Cellular communication concepts
- Study the mobile radio propagation
- Study the wireless network different type of MAC protocols.

UNIT -I:

The Cellular Concept-System Design Fundamentals: Introduction, Frequency Reuse, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , Power Control for Reducing interference, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Trunking and Grade of Service.

UNIT –II:

Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, Basic Propagation Mechanisms, Reflection: Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (TwoRay) Model, Diffraction: Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models- Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT –III:

Mobile Radio Propagation: Small –Scale Fading and Multipath Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke"s model for flat fading, spectral shape due to Doppler spread in Clarke"s model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT -IV:

Equalization and Diversity: Introduction, Fundamentals of Equalization, Training a Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity -Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT -V:

Wireless Networks : Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

TEXT BOOKS:

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2 nd Ed., 2002, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
3. Mobile Cellular Communication – Gottapu SasibhushanaRao, Pearson Education, 2012.

REFERENCE BOOKS:

1. Principles of Wireless Networks – KavehPahLaven and P. Krishna Murthy, 2002, PE
2. Wireless Digital Communications – KamiloFeher, 1999, PHI.
3. Wireless Communication and Networking – William Stallings, 2003, PHI.
4. Wireless Communication – UpenDalal, Oxford Univ. Press
5. Wireless Communications and Networking – Vijay K. Gary, Elsevier.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1203	L	T	P	C
		3	0	0	3
CMOS ANALOG & DIGITAL IC DESIGN (PROGRAM ELECTIVE-III)					

Course Outcomes:

At the end of this course, students will be able to

- Analyze, design, optimize and simulate analog and digital circuits using CMOS constrained by the design metrics.
- Connect the individual gates to form the building blocks of a system.
- Use EDA tools like Cadence, Mentor Graphics and other open source software tools like Ng spice.

UNIT-I:

MOS Devices and Modeling : The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model. MOS Design:Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II:

Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

Sequential MOS Logic Circuits: Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT -III:

Dynamic Logic Circuits: Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

Semiconductor Memories: Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

UNIT -IV:

Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascade current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT-V:

CMOS Amplifiers: Inverters, Differential Amplifiers, Cascade Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

CMOS Operational Amplifiers: Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascade Op Amps, Measurement Techniques of OP Amp.

TEXT BOOKS:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.
2. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3 rd Ed., 2011.
3. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
4. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.

REFERENCE BOOKS:

1. Analog Integrated Circuit Design- David A. Johns, Ken Martin, Wiley Student Edn, 2016.
2. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition.
3. CMOS: Circuit Design, Layout and Simulation- Baker, Li and Boyce, PHI.
4. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, BorivojeNikolic, 2 nd Ed., PHI.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1204	L	T	P	C
		3	0	0	3
ADVANCED COMPUTER ARCHITECTURE (PROGRAM ELECTIVE-III)					

Course Outcomes:

At the end of this course, students will be able to

- Understand parallelism and pipelining concepts, the design aspects and challenges.
- Evaluate the issues in vector and array processors.
- Study and analyze the high performance scalable multithreaded and multiprocessor systems.

UNIT-I:

Fundamentals of Computer Design: Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, measuring and reporting performance, Quantitative principles of computer design, Amdahl"s law. Instruction set principles and examples- Introduction, classifying instruction set-memory addressing type and size of operands, Operations in the instruction set.

UNIT-II:

Pipelines: Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

Memory Hierarchy Design: Introduction, review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT-III:

Instruction Level Parallelism (ILP)-The Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo"s approach, Branch prediction, High performance instruction delivery- Hardware based speculation.

ILP Software Approach: Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware verses Software.

UNIT-IV:

Multi Processors and Thread Level Parallelism: Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – Memory architecture, Synchronization.

UNIT-V:

Inter Connection and Networks: Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters. Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS:

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3 rd Edition, an Imprint of Elsevier.

REFERENCE BOOKS:

1. John P. Shen and Miikko H. Lipasti -, Modern Processor Design : Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing - Kai Hwang, Faye A.Brigs., MC Graw Hill.
3. Advanced Computer Architecture - A Design Space Approach, DezsoSima, Terence Fountain, Peter Kacsuk, Pearson Ed.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1205	L	T	P	C
		3	0	0	3
SOFT COMPUTING TECHNIQUES (PROGRAM ELECTIVE -III)					

Course Outcomes

At the end of this course the student can able to:

- Understand the basic concepts of Artificial neural network systems.
- Understand the McCulloch-Pitts neuron model, simple and multilayer Perception, Adeline and Madeline concepts.
- Data processing, Hopfield and self-organizing network.
- Difference between crisp sets to fuzzy sets, fuzzy models, fuzzification, inference,
- membership functions, rule based approaches and defuzzification.
- Self – organizing fuzzy logic control, non linear time delay systems.
- Understand the concept of Genetic Algorithm steps. Tabu, anD-colony search techniques for solving optimization problems.
- GA applications to power system optimization problems, identification and control of linear and nonlinear dynamic systems using MATLAB-Neural network toolbox.
- Know the application and importance stability analysis

UNIT –I:

Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule based systems, the AI approach, Knowledge representation - Expert systems.

UNIT –II:

Artificial Neural Networks: Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT –III:

Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT –IV:

Genetic Algorithm: Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and anD-colony search techniques for solving optimization problems.

UNIT –V:

Applications: GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis of Neural Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. &Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994.
3. Introduction to Fuzzy Control - Driankov, Hellendroon, Narosa Publishers.
4. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi.
5. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International.
6. Artificial Neural Network –Simon Haykin, 2 nd Ed., Pearson Education.
7. Introduction Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa,1/e, TMH, New Delhi.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1206	L	T	P	C
		3	0	0	3
DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES (PROGRAM ELECTIVE -IV)					

Course Objectives:

- To recall the digital transform techniques (Fourier and z-domain).
- To introduce architectural features of programmable DSP Processors of Texas Instruments (TI"s) and Analog Devices (AD"s).
- To give practical examples of DSP Processor architectures for better understanding.
- To develop the programming knowledge using Instruction set of DSP Processors.
- To understand interfacing techniques to memory and I/O devices.

Course Outcomes:

At the end of this course, students will be able to

- Understand the basics concepts of Digital Signal Processing (DSP) and transforms.
- To distinguish between the architectural features of General purpose processors and Programmable DSP processors.
- Understand the architectures of TMS320C54xx devices.
- Understand the architectures of ADSP 2100 DSP devices and Black fin Processor.
- Interface various devices to DSP Processors.
- Able to write simple assembly language programs using instruction set of TMS320C54xx.

UNIT –I:

Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT –II:

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT -III:

Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT –IV:

Analog Devices Family of DSP Devices: Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT –V:

Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004. 2. A Practical Approach to Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
2. Embedded Signal Processing with the Micro Signal Architecture Publisher: Woon-SengGan, Sen M. Kuo, Wiley-IEEE Press, 2007

REFERENCE BOOKS:

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing –Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. 2000, S. Chand & Co.
4. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
5. The Scientist and Engineer's Guide to Digital Signal Processing by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997
6. Embedded Media Processing by David J. Katz and Rick Gentile of Analog Devices, Newnes , ISBN 0750679123, 2005.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1207	L	T	P	C
		3	0	0	3
ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY (EMI / EMC) (PROGRAM ELECTIVE-IV)					

Course objectives:

- To introduce enough knowledge regarding the Electromagnetic interference/ Electromagnetic compatibility, Its practical experiences and concerns, and various sources both the natural and Nuclear sources of EMI.
- To know the practical experiences due to EMI such as mains power supply, switches and relaysetc and Analyze EM Propagation and Crosstalk.
- To know various methods of the measurements radiated and conducted interference in open area test sites and in chambers.
- To Learn about the various methods of minimizing the EMI.
- To know the National/International EMC Standards.

Course outcomes:

At the end of this course the student can able to:

- Understand the electromagnetic environment the definitions of EMI and EMC, history of EMI some examples of practical experiences due to EMI such as mains power supply, switches and relays etc.
- Understand the celestial electromagnetic noise the occurrence of lightning discharge and their effects, the charge accumulation and discharge in an electrostatic discharge, model ESD wave form, the various cases of nuclear explosion and the transients.
- Understand the methods to measure RE and RS in the open are test sites
- Understand the measurement facilities and procedures using anechoic chamber, TEM cell, reverberating chamber GTEM cell.

UNIT -I:

Introduction, Natural and Nuclear Sources of EMI / EMC: Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations, An overview of EMI / EMC, Natural and Nuclear sources of EMI.

UNIT -II:

EMI from Apparatus, Circuits and Open Area Test Sites: Electromagnetic emissions, Noise from relays and switches, Non-linearities in circuits, passive intermodulation, Cross talk in transmission lines, Transients in power supply lines, Electromagnetic interference (EMI), Open area test sites and measurements.

UNIT -III:

Radiated and Conducted Interference Measurements and ESD: Anechoic chamber, TEM cell, GH TEM Cell, Characterization of conduction currents / voltages, Conducted EM noise on power lines, Conducted EMI from equipment, Immunity to conducted EMI detectors and measurements, ESD, Electrical fast transients / bursts, Electrical surges.

UNIT -IV:

Grounding, Shielding, Bonding and EMI filters: Principles and types of grounding, Shielding and bonding, Characterization of filters, Power lines filter design.

UNIT -V:

Cables, Connectors, Components and EMC Standards: EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, optoisolators, National / International EMC standards.

TEXT BOOKS:

1. Engineering Electromagnetic Compatibility - Dr. V.P. Kodali, IEEE Publication, Printed in India by S. Chand & Co. Ltd., New Delhi, 2000.
2. Electromagnetic Interference and Compatibility IMPACT series,IIT – Delhi, Modules 1-9

REFERENCE BOOKS:

1. Introduction to Electromagnetic Compatibility - Ny, John Wiley, 1992, by C.R. Pal.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1208	L	T	P	C
		3	0	0	3
OBJECT ORIENTED PROGRAMMING (PROGRAM ELECTIVE IV)					

OBJECTIVES:

The main objectives of this course are given below:

• Its main objective is to teach the basic concepts and techniques and java program structure which form the object oriented programming paradigm.

OUTCOMES:

At the end of this course the student can able to:

- The model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism
- Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections
- How to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.
- How to test, document and prepare a professional looking package for each business project using java doc.

UNIT I:

Objective: Focus on object oriented concepts and java program structure and its installation Introduction to OOP: Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Installation of JDK1.6

UNIT II:

Objective: Comprehension of java programming constructs, control structures in Java Programming Constructs Variables , Primitive Data types, Identifiers- Naming Coventions, Keywords, Literals, Operators Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control-Branching, Conditional, loops.,

Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

UNIT III:

Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class Interfaces,

Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages , using Packages, Access protection, java.lang package

Exceptions & Assertions - Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user defined exception, Assertions

UNIT IV:

Objective: Understanding of Thread concepts and I/O in Java

Multithreading: java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading, Synchronization, suspending and Resuming threads, Communication between Threads

Input/output: reading and writing data, java.io package

UNIT V:

Objective: Being able to build dynamic user interfaces using applets and Event handling in java Applets- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()

Event Handling -Introduction, Event Delegation Model, java.awt.event Description, Event Listeners, Adapter classes, Inner classes.

Understanding of various components of Java AWT and Swing and writing code snippets using them Abstract Window Toolkit

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

Swing: Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box.

TEXT BOOKS:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabhchoudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH
5. Introduction to Java rogramming, 7 thed, Y Daniel Liang, Pearson

REFERENCE BOOKS:

1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, NageswaraRao, Wiley, Dream Tech
3. Core JAVA for Beginners, RashmiKanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna , University Press

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1209	L	T	P	C
		0	0	4	2
ADVANCED COMMUNICATIONS LAB					

Course Outcomes:

At the end of this course, students will be able to

- Identify the different types of network devices and their functions within a network.
- Understand and build the skills of sub-netting and routing mechanisms.
- Understand basic protocols of computer networks, and how they can be used to assist in network design and implementation.

A. Minimum of 10 Experiments have to be conducted

B. All Experiments may be Simulated using MATLAB and to be verified using related Training kits.

1. Measurement of Bit Error Rate using Binary Data
2. Verification of minimum distance in Hamming code
3. Determination of output of Convolutional Encoder for a given sequence
4. Determination of output of Convolutional Decoder for a given sequence
5. Efficiency of DS Spread- Spectrum Technique.
6. Simulation of Frequency Hopping (FH) system.
7. Effect of Sampling and Quantization of Digital Image.
8. Verification of Various Transforms (FT / DCT/ Walsh / Hadamard) on a given Image
9. (Finding Transform and Inverse Transform).
10. Point, Line and Edge detection techniques using derivative operators.
11. Implementation of FIR filters using DSP Trainer Kit (C-Code/ Assembly code).
12. Implementation of IIR filter using DSP Trainer Kit (C-Code/ Assembly code) .
13. Determination of Losses in Optical Fiber.
14. Observing the Waveforms at various test points of a mobile phone using Mobile Phone
15. Trainer.
16. Study of Direct Sequence Spread Spectrum Modulation & Demodulation using CDMA-
17. DSS-BER Trainer.
18. Study of ISDN Training System with Protocol Analyzer.
19. Characteristics of LASER Diode.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1210	L	T	P	C
		0	0	4	2
ADVANCED DIGITAL IMAGE AND VIDEO PROCESSING LAB					

Course Outcomes:

At the end of this course, students will be able to

- Perform and analyze image and video enhancement and restoration
- Perform and analyze image and video segmentation and compression
- Work and process viz., detection, extraction on the image/video.

List of Experiments:

1. Perform basic operations on images like addition, subtraction etc.
2. Plot the histogram of an image and perform histogram equalization
3. Implement segmentation algorithms
4. Perform video enhancement
5. Perform video segmentation
6. Perform image compression using lossy technique
7. Perform image compression using lossless technique
8. Perform image restoration
9. Convert a colour model into another
10. Calculate boundary features of an image
11. Calculate regional features of an image
12. Detect an object in an image/video using template matching/Bayes classifier.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1211	L	T	P	C
		2	0	0	2
MINI PROJECT					

Course Outcomes:

At the end of this course, students will be able to

- Understand of contemporary / emerging technology for various processes and systems.
- Share knowledge effectively in oral and written form and formulate documents,

Syllabus Contents:

The students are required to search / gather the material / information on a specific a topic comprehend it and present / discuss in the class.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2108	L	T	P	C
		3	0	0	3
COMPOSITE MATERIALS (OPEN ELECTIVE)					

UNIT–I:

INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II:

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT – III:

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–IV:

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – V:

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition,2007.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2107	L	T	P	C
		3	0	0	3
COST MANAGEMENT OF ENGINEERING PROJECTS (OPEN ELECTIVE)					

Introduction and Overview of the Strategic Cost Management Process

Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector .Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing. Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi.
2. Charles T. Horngren and George Foster, Advanced Management Accounting.
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting.
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher.
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2106	L	T	P	C
		3	0	0	3
OPERATIONS RESEARCH (OPEN ELECTIVE)					

Course Outcomes:

At the end of the course, the student should be able to

- Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.
- Students should able to apply the concept of non-linear programming
- Students should able to carry out sensitivity analysis
- Student should able to model the real world problem and simulate it.

Unit 1:

OPENELECTIVES OPERATIONSRESEARCH: Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Tcchniques, Sensitivity Analysis, Inventory Control Models

Unit 2:

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Unit 3:

Nonlinear programming: problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit 4:

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit 5:

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

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Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman &Hall London

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

AUDIT 1 and 2: VALUE EDUCATION

Course Objectives:

Students will be able to

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Syllabus:

Unit	Content	Hours
1	• Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. • Moral and non- moral valuation. Standards and principles. • Value judgements	4
2	• Importance of cultivation of values. • Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. • Honesty, Humanity. Power of faith, National Unity. • Patriotism.Love for nature ,Discipline	6
3	• Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. • Punctuality, Love and Kindness. • Avoid fault Thinking. • Free from anger, Dignity of labour. • Universal brotherhood and religious tolerance. • True friendship. • Happiness Vs suffering, love for truth. • Aware of self-destructive habits. • Association and Cooperation. • Doing best for saving nature	6
4	• Character and Competence –Holy books vs Blind faith. • Self-management and Good health. • Science of reincarnation. • Equality, Nonviolence, Humility, Role of Women. • All religions and same message. • Mind your Mind, Self-control. • Honesty, Studying effectively	6

Suggested reading:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi Course outcomes
2. Students will be able to
3. Knowledge of self-development
4. Learn the importance of Human values Developing the overall personality

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

AUDIT 1 and 2: CONSTITUTION OF INDIA

Course Objectives:

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals" constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.

Course Outcomes:

Students will be able to:

- 1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- 2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- 3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- 4. Discuss the passage of the Hindu Code Bill of 1956.

Syllabus;

Unit	Content	Hours
1	•History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)	4
2	•Philosophy of the Indian Constitution: Preamble Salient Features	4
3	Contours of Constitutional Rights & Duties: • Fundamental Rights • Right to Equality • Right to Freedom • Right against Exploitation • Right to Freedom of Religion • Cultural and Educational Rights • Right to Constitutional Remedies • Directive Principles of State Policy • Fundamental Duties.	4
4*	• Organs of Governance:	4

	• Parliament • Composition • Qualifications and Disqualifications Powers and Functions • Executive • President • Governor • Council of Ministers • Judiciary, Appointment and Transfer of Judges, Qualifications • Powers and Functions	
5	• Local Administration: • District"s Administration head: Role and Importance, • Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation. • Pachayati raj: Introduction, PRI: ZilaPachayat. • Elected officials and their roles, CEO ZilaPachayat: Position and role. • Block level: Organizational Hierarchy (Different departments), • Village level: Role of Elected and Appointed officials, • Importance of grass root democracy	4
6	• Election Commission: • Election Commission: Role and Functioning. • Chief Election Commissioner and Election Commissioners. • State Election Commission: Role and Functioning. • Institute and Bodies for the welfare of SC/ST/OBC and women.	4

Suggested reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

AUDIT 1 and 2: PEDAGOGY STUDIES

Course Outcomes:

Students will be able to:

- What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?
- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Syllabus:

Unit	Content	Hours
1	Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.	4
2	Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. • Curriculum, Teacher education.	2
3	• Evidence on the effectiveness of pedagogical practices • Methodology for the in depth stage: quality assessment of included studies. • How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? • Theory of change. • Strength and nature of the body of evidence for effective pedagogical practices. • Pedagogic theory and pedagogical approaches. •Teachers" attitudes and beliefs and Pedagogic strategies..	4

4	• Professional development: alignment with classroom practices and follow-up support • Peer support • Support from the head teacher and the community. • Curriculum and assessment • Barriers to learning: limited resources and large class sizes	4
5	• Research gaps and future directions • Research design • Contexts • Pedagogy • Teacher education • Curriculum and assessment • Dissemination and research impact.	2

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.

2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.

3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.

5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.

6. Chavan M (2003) Read India: A mass scale, rapid, „learning to read" campaign.

7. www.pratham.org/images/resource%20working%20paper%202.pdf.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

AUDIT 1 and 2: STRESS MANAGEMENT BY YOGA

Course Objectives

1. To achieve overall health of body and mind
2. To overcome stress

Syllabus:

Unit	Content	Hours
1	• Definitions of Eight parts of yog. (Ashtanga)	8
2	Yam and Niyam. Do`s and Don"t"s in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha • Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8
3	• Asan and Pranayam 1. Various yog poses and their benefits for mind & body • Regularization of breathingtechniques and its effects-Types of pranayam	8

Suggested reading

1. „Yogic Asanas for Group Tarining-Part-I" : Janardan Swami YogabhyasiMandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda,

Course Outcomes:

Students will be able to:

1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

AUDIT 1 and 2: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Course Objectives

1. To learn to achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

Syllabus:

Unit	Content	Hours
1	Neetisatakam-Holistic development of personality • Verses- 19,20,21,22 (wisdom) • Verses- 29,31,32 (pride & heroism) • Verses- 26,28,63,65 (virtue) • Verses- 52,53,59 (dont"s) • Verses- 71,73,75,78 (do"s)	8
2	Approach to day to day work and duties • Shrimad Bhagwad Geeta : • Chapter 2-Verses 41, 47,48, • Chapter 3-Verses 13, 21, 27, 35, • Chapter 6-Verses 5,13,17, 23, 35, • • Chapter 18-Verses 45, 46, 48.	8
3	Statements of basic knowledge. • Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 • Chapter 12 -Verses 13, 14, 15, 16,17, 18 • Personality of Role model. • Shrimad Bhagwad Geeta: • Chapter2- Verses 17, • Chapter 3-Verses 36,37,42, • Chapter 4-Verses 18, 38,39 • • Chapter18 – Verses 37,38,63	8

Suggested reading

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari"s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
3. Study of Neetishatakam will help in developing versatile personality of students.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2103	L	T	P	C
		3	0	0	3
CODING THEORY AND APPLICATIONS (PROGRAM ELECTIVE V)					

Course Outcomes:

On completion of this course student will be able to

- Learning the measurement of information and errors.
- Obtain knowledge in designing Linear Block Codes and Cyclic codes.
- Construct tree and trellies diagrams for convolution codes
- Design the Turbo codes and Space time codes and also their applications

UNIT –I:

Coding for Reliable Digital Transmission and Storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies. Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT –II:

Cyclic Codes: Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT –III:

Convolutional Codes: Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT –IV:

Burst –Error-Correcting Codes: Decoding of Single-Burst error Correcting Cyclic codes, SingleBurst-Error-Correcting Cyclic codes, Burst-Error-Correcting Convolutional Codes, Bounds on Burst Error-Correcting Capability, Interleaved Cyclic and Convolutional Codes, Phased-Burst –ErrorCorrecting Cyclic and Convolutional codes.

TEXT BOOKS:

1. Digital Signal Processing: Principles, Algorithms & Applications - J.G.Proakis& D. G. Manolakis, 4th Ed., PHI.
2. Discrete Time Signal Processing - Alan V Oppenheim & R. W Schaffer, PHI.
3. DSP – A Practical Approach – Emmanuel C. Ifeacher, Barrie. W. Jervis, 2 Ed., Pearson Education.

REFERENCE BOOKS:

1. Modern Spectral Estimation: Theory & Application – S. M .Kay, 1988, PHI.
2. Multi Rate Systems and Filter Banks – P.P.Vaidyanathan – Pearson Education.
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj, C.Gnanapriya, 2000,TMH
4. Digital Spectral Analysis – Jr. Marple

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2102	L	T	P	C
		3	0	0	3
ADVANCED DIGITAL SIGNAL PROCESSING (PROGRAM ELECTIVE V)					

Course Outcomes:

At the end of this course, students will be able to

- To understand theory of different filters and algorithms
- To understand theory of multi rate DSP, solve numerical problems and write algorithms
- To understand theory of prediction and solution of normal equations
- To know applications of DSP at block level

UNIT –I:

Review of DFT, FFT, IIR Filters and FIR Filters: Multi Rate Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion.

UNIT –II:

Applications of Multi Rate Signal Processing: Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters, Implementation of Digital Filter Banks, Sub-band Coding of Speech Signals, Quadrature Mirror Filters, Trans-multiplexers, Over Sampling A/D and D/A Conversion.

UNIT -III:

Non-Parametric Methods of Power Spectral Estimation: Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman-Tukey methods, Comparison of all Non-Parametric methods

UNIT –IV:

Implementation of Digital Filters: Introduction to filter structures (IIR & FIR), Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT –V:

Parametric Methods of Power Spectrum Estimation: Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

TEXT BOOKS:

1. Random Signals: Detection, Estimation and Data Analysis - K. Sam Shanmugan& A.M. Breipohl, Wiley India Pvt. Ltd, 2011.
2. Random Processes: Filtering, Estimation and Detection - Lonnie C. Ludeman, Wiley India Pvt. Ltd., 2010.

REFERENCE BOOKS:

1. Fundamentals of Statistical Signal Processing: Volume I Estimation Theory– Steven.M.Kay, Prentice Hall, USA, 1998.
2. Fundamentals of Statistical Signal Processing: Volume I Detection Theory– Steven.M.Kay, Prentice Hall, USA, 1998.
3. Introduction to Statistical Signal Processing with Applications - Srinath, Rajasekaran, Viswanathan, 2003, PHI.
4. Statistical Signal Processing: Detection, Estimation and Time Series Analysis – Louis L.Scharf, 1991, Addison Wesley.
5. Detection, Estimation and Modulation Theory: Part – I – Harry L. Van Trees, 2001, John Wiley & Sons, USA.
6. Signal Processing: Discrete Spectral Analysis – Detection & Estimation – Mischa Schwartz, Leonard Shaw, 1975, McGraw Hill.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2101	L	T	P	C
		3	0	0	3

DETECTION AND ESTIMATION THEORY
(PROGRAM ELECTIVE V)

Course Outcomes:

- At the end of this course, students will be able to
- Understand the mathematical background of signal detection an destimation
- Use classical and Bayesian approaches to formulate and solve problems for signal detection and parameter estimation from noisy signals.
- Derive and apply filtering methods for parameter estimation.

UNIT –I:

Random Processes: Discrete Linear Models, Markov Sequences and Processes, Point Processes, and Gaussian Processes.

UNIT –II:

Detection Theory: Basic Detection Problem, Maximum A posteriori Decision Rule, Minimum Probability of Error Classifier, Bayes Decision Rule, Multiple-Class Problem (Bayes)- minimum probability error with and without equal a priori probabilities, Neyman-Pearson Classifier, General Calculation of Probability of Error, General Gaussian Problem, Composite Hypotheses.

UNIT –III:

Linear Minimum Mean-Square Error Filtering: Linear Minimum Mean Squared Error Estimators, Nonlinear Minimum Mean Squared Error Estimators. Innovations, Digital Wiener Filters with Stored Data, Real-time Digital Wiener Filters, Kalman Filters.

UNIT –IV:

Statistics: Measurements, Nonparametric Estimators of Probability Distribution and Density Functions, Point Estimators of Parameters, Measures of the Quality of Estimators, Introduction to Interval Estimates, Distribution of Estimators, Tests of Hypotheses, Simple Linear Regression, Multiple Linear Regression.

UNIT –V:

Estimating the Parameters of Random Processes from Data: Tests for Stationary and Ergodicity, Model-free Estimation, Model-based Estimation of Autocorrelation Functions, Power Special Density Functions.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SEMESTER - III							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
Program Elective-5							
1	MT24DE2101	Detection & Estimation Theory	PE	3	0	0	3
	MT24DE2102	Advanced Digital Signal Processing	PE	3	0	0	3
	MT24DE2103	Coding Theory and Applications	PE	3	0	0	3
Open Elective							
2	MT24DE2104	Business Analytics	OE	3	0	0	3
	MT24DE2105	Industrial Safety	OE	3	0	0	3
	MT24DE2106	Opcrations Research	OE	3	0	0	3
	MT24DE2107	Cost Management of Engineering Projects	OE	3	0	0	3
	MT24DE2108	Composite Materials	OE	3	0	0	3
	MT24DE2109	Waste to Energy	OE	3	0	0	3
3	MT24DE21110	**Dissertation Phase–I**	PJ	0	0	20	10
Total Credits							16

SEMESTER - IV							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
1	MT24DE2201	**Dissertation Phase–II**	PJ	0	0	32	16
Total Credits							16

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

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	• Right to Constitutional Remedies • Directive Principles of State Policy • Fundamental Duties.	
4	• Organs of Governance: • Parliament • Composition • Qualifications and Disqualifications Powers and Functions • Executive • President • Governor • Council of Ministers • Judiciary, Appointment and Transfer of Judges, Qualifications • Powers and Functions	4
5	• Local Administration: • District"s Administration head: Role and Importance, • Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation. • Pachayati raj: Introduction, PRI: ZilaPachayat. • Elected officials and their roles, CEO ZilaPachayat: Position and role. • Block level: Organizational Hierarchy (Different departments), • Village level: Role of Elected and Appointed officials, • Importance of grass root democracy	4
6	• Election Commission: • Election Commission: Role and Functioning. • Chief Election Commissioner and Election Commissioners. • State Election Commission: Role and Functioning. • Institute and Bodies for the welfare of SC/ST/OBC and women.	4

Suggested reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

II Semester	Course Code: MT24DE1212	L	T	P	C
		2	0	0	0
CONSTITUTION OF INDIA (AUDIT 2)					

Course Objectives:

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals" constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.

Course Outcomes:

Students will be able to:

- 1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- 2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- 3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- 4. Discuss the passage of the Hindu Code Bill of 1956.

Syllabus;

Unit	Content	Hours
1	•History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)	4
2	•Philosophy of the Indian Constitution: Preamble Salient Features	4
3	Contours of Constitutional Rights & Duties: • Fundamental Rights • Right to Equality • Right to Freedom • Right against Exploitation • Right to Freedom of Religion • Cultural and Educational Rights	4

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2105	L	T	P	C
		3	0	0	3
INDUSTRIAL SAFETY (OPEN ELECTIVE)					

Unit-1:

OPENELECTIVES INDUSTRIALSAFETY Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Unit-2:

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-3:

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-4:

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment"s like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine,v. Boiler,vi .Electrical motors, Types of faults in machine tools and their general causes.

Unit-5:

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets,

Unit 5:

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.

Unit 6:

Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism

Reference:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FTPress.
2. Business Analytics by James Evans, persons Education.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2104	L	T	P	C
		3	0	0	3
BUSINESS ANALYTICS (OPEN ELECTIVE)					

COURSE OUTCOMES:

- Students will demonstrate knowledge of data analytics.
- Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
- Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
- Students will demonstrate the ability to translate data into clear, actionable insights

Unit1:

Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

Unit 2:

Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology

Unit 3:

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

Unit 4:

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte CarleSimulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

UNIT -V:

BCH – Codes: BCH code- Definition, Minimum distance and BCH Bounds, Decoding Procedure for BCH Codes- Syndrome Computation and Iterative Algorithms, Error Location Polynomials and Numbers for single and double error correction

TEXT BOOKS:

1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello,Jr, Prentice Hall, Inc.
2. Error Correcting Coding Theory-Man Young Rhee- 1989, McGraw-Hill Publishing.

REFERENCE BOOKS:

1. Digital Communications-Fundamental and Application - Bernard Sklar, PE.
2. Digital Communications- John G. Proakis, 5 th Ed., 2008, TMH.
3. Introduction to Error Control Codes-Salvatore Gravano-oxford
4. Error Correction Coding – Mathematical Methods and Algorithms – Todd K.Moon, 2006, Wiley India.
5. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Ed, 2009, TMH.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2109	L	T	P	C
		3	0	0	3
WASTE TO ENERGY (OPEN ELECTIVE)					

Unit-I:

OPEN ELECTIVE WASTE TO ENERGY: Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II:

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III:

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation

Unit-IV:

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-V:

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo - Brobby and E. B. Hagan, John Wiley & Sons.

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References:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K. Chawla.
3. Composite Materials Science and Applications – Deborah D.L.Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

III Semester	Course Code: MT24DE2110	L	T	P	C
		0	0	20	10
DISSERTATION PHASE – I (OPEN ELECTIVE)					

Course Outcomes:

At the end of this course, students will be able to

1. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
2. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
3. Ability to present the findings of their technical solution in a written report.
4. Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need • Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Implementation and Verification
- Report and presentation

The dissertation stage II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

- Experimental verification / Proof of concept.
- Design, fabrication, testing of Communication System.
- The viva-voce examination will be based on the above report and work.

Guidelines for Dissertation Phase – I and II at M. Tech. (Electronics):

• As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.

• The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.

• After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.

• Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

• Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.

• Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

• During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

• Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, a record of continuous progress.

• Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

IV Semester	Course Code: MT24DE2201	L	T	P	C
		0	0	32	16
DISSERTATION PHASE – II (OPEN ELECTIVE)					

Course Outcomes:

At the end of this course, students will be able to

1. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
2. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
3. Ability to present the findings of their technical solution in a written report.
4. Presenting the work in International/ National conference or reputed journals.

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

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• Relevance to industry need • Problems of national importance

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The student should complete the following:

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• Motivation for study and Objectives

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• Report and presentation

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• After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.

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• Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

• During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

• Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, a record of continuous progress.

• Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

AUDIT 1 and 2: ENGLISH FOR RESEARCH PAPER WRITING

Course objectives:

Students will be able to:

Understand that how to improve your writing skills and level of readability

Learn about what to write in each section

Understand the skills needed when writing a Title Ensure the good quality of paper at very first time submission.

Syllabus:

UNITS	CONTENTS	Hours
1	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	4
4	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,	4
5	skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	4
6	useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman"sbook . 4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)
BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

AUDIT 1 and 2: DISASTER MANAGEMENT

Course Objectives: - Students will be able to:

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Syllabus:

UNITS	CONTENTS	Hours
1	Introduction Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude	4
2	Repercussions Of Disasters And Hazards: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Manmade disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	4
3	Disaster Prone Areas In India Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	4
4	Disaster Preparedness And Management Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness..	4
5	Risk Assessment Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People"s Participation In Risk Assessment. Strategies for Survival.	4

6	Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	4

Suggested Readings:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies ""New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

AUDIT 1 and 2: SANSKRIT FOR TECHNICAL KNOWLEDGE

Course Objectives:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Syllabus:

Unit	Content	Hours
1	• Alphabets in Sanskrit, • Past/Present/Future Tense, • Simple Sentences	8
2	• Order • Introduction of roots • Technical information about Sanskrit Literature	8
3	• Technical concepts of Engineering - Electrical, Mechanical, Architecture, Mathematics	8

Suggested reading

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India"s Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

Course Output Students will be able to

1. Understanding basic Sanskrit language.
2. Ancient Sanskrit literature about science & technology can be understood.
3. Being a logical language will help to develop logic in students.

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D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

M.Tech., I Semester Regular Examinations JAN-2025(Model Paper)

Subject Name: Digital System Design

Time: 3 Hrs Max. Marks: 75

S.no			Answer All Questions, One from each Unit Case Study is Compulsory	Marks
1.			**Unit-I**	**15 M**
	A.	i.	Explain the procedure how to minimization of switching function using tabular method with one example	CO1- (7M)
		ii.	Explain the Determination of solution cube using CAMP-II algorithm	CO1- (8M)
			OR	
	B.	i.	Briefly explain the CAMP-1 algorithm procedure with examples	CO1- (7M)
		ii.	Give the procedure steps for Cube based algorithm and explain its operation with examples	CO1- (8M)
			Unit-II	**15 M**
2.	A.	i.	Realize F1 and F2 using PLA. Give the PLA table and internal connection diagram for the PLA F1(a,b,c,d)=∑m(1,2,3,4,5,6,8,9,10,12,14) F2(a,b,c,d)= ∑m(1,2,4,6,10,11,12,14,15)	CO2- (8M)
		ii.	Explain the difference between PLA and PAL with advantages of both	CO2- (7M)
			OR	
	B.	i.	Explain podem with an example.	CO2- (8M)
		ii.	Explain transition count testing with an example.	CO2- (7M)
3.			**Unit-III**	**15 M**
	A.	i.	Explain the following terms in detail (i) Derivation of SM Charts (ii) Realization of SM Charts	CO3- (8M)
		ii.	Draw the general structure of a CPLD and explain how a logic function can be realized on CPLD with simple example	CO3- (7M)
			OR	
	B.	i.	Draw the flowchart for Dice game and explain its operation with SM chart	CO3- (8M)
		ii.	Explain the difference between flowchart and SM chart with symbols	CO3- (7M)
4.			**Unit-IV**	**12 M**
	A.	i.	Draw the architecture of Built in self-test and explain its operation	CO4- (8M)
		ii.	Explain the test generation and test process in a combinational circuits	CO4- (7M)
			OR	
	B.	i.	Explain the following Test algorithms in detail (i) D algorithm (ii) PODEM	CO4- (8M)
		ii.	Describe briefly the various DFT schemes used in digital systems?	CO4- (7M)
5.			**Unit-V**	**15 M**
	A.	i.	Explain the concept Fault detection and location in Sequential circuits	CO5- (8M)
		ii.	Explain Transition check approach in sequential circuits.	CO5- (7M)
			OR	
	B.	i.	Explain the concept of Circuit Test Approach of a sequential circuits along with one example	CO5- (8M)
		ii.	Explain the procedure of State identification of a sequential circuits in detail	CO5- (7M)
			* * *	

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D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

M.Tech., I Semester Regular Examinations JAN-2025(Model Paper)

Subject Name: Digital Data Communication

Time: 3 Hrs Max. Marks: 75

S.no			Answer All Questions, One from each Unit Case Study is Compulsory	Marks
1.			**Unit-I**	**15 M**
	A.	i.	Explain the principle of QAM with the help of a neat diagram.	CO1- (7M)
		ii.	What is a constellation diagram? Explain the constellation diagram of 16QAM.	CO1- (8M)
			OR	
	B.	i.	What are different types of digital data transmission modes? Explain with examples.	CO1- (7M)
		ii.	Explain the OSI model for networking in brief. How does it differ from TCP/IP model?	CO1- (8M)
			Unit-II	**15 M**
2.	A.	i.	With the help of a neat diagram, explain the DTE-DCE interface.	CO2- (8M)
		ii.	Explain the various network topologies and compare the performance of each	CO2- (7M)
			OR	
	B.	i.	What are the various types of error correction codes?	CO2- (8M)
		ii.	Explain the various network topologies and compare the performance of each topology.	CO2- (7M)
3.			**Unit-III**	**15 M**
	A.	i.	What are the different types of packet switching? Explain.	CO3- (8M)
		ii.	Explain the architecture of IEEE 802.6.	CO3- (7M)
			OR	
	B.	i.	What are the different functions of bridges in the network? Explain various types of bridges used in the network.	CO3- (8M)
		ii.	Compare the time division and frequency division multiplexing techniques.	CO3- (7M)
4.			**Unit-IV**	**12 M**
	A.	i.	What is the need for multiplexing and explain various types of multiplexing techniques?	CO4- (8M)
		ii.	Explain various LAN topologies.	CO4- (7M)
			OR	
	B.	i.	Compare various switching techniques in detail	CO4- (8M)
		ii.	Explain the function of various internetworking devices.	CO4- (7M)
5.			**Unit-V**	**15 M**
	A.	i.	Briefly explain various multiple access techniques.	CO5- (8M)
		ii.	What are the demerits in OFDMA? Explain how they can be overcome?	CO5- (7M)
			OR	
	B.	i.	Explain the principle and working advantages and applications of CDMA.	CO5- (8M)
		ii.	Explain the principle and working of CSMA/CA technique in detail.	CO5- (7M)
			* * *	

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M.Tech., I Semester Regular Examinations JAN-2025(Model Paper)

Subject Name: Optical Communiction Technology

Time: 3 Hrs Max. Marks: 75

S.no			Answer All Questions, One from each Unit Case Study is Compulsory	Marks
1.			**Unit-I**	**15 M**
	A.	i.	Discuss the phenomena of light propagation in dielectric wave slides	CO1- (7M)
		ii.	Give an account on stimulated Roman scattering.	CO1- (8M)
			OR	
	B.	i.	What is the basic principle of light propagation in optical fiber? Explain in detail.	CO1- (7M)
		ii.	A typical sheet of paper is 0.003 inches thick. How many wavelengths of 820 nm light (which is widely used in optical fiber systems) will fit into this distance? How does this compare to a 50 μm diameter optical fiber?	CO1- (8M)
			Unit-II	**15 M**
2.	A.	i.	Derive the power transfer function of the Fabry –Perot filter.	CO2- (8M)
		ii.	Show that the FWHM bandwidth of the acousto –optic filter is $2 \approx 0.8\lambda 0 / An$.	CO2- (7M)
			OR	
	B.	i.	Define modulation , and discuss the signal formats for modulation.	CO2- (8M)
		ii.	What are the types of optical switches? Explain in detail any two switches.	CO2- (7M)
3.			**Unit-III**	**15 M**
	A.	i.	Write a short notes on error detection and correction.	CO3- (8M)
		ii.	Discuss in detail optical duo binary modulation.	CO3- (7M)
			OR	
	B.	i.	Describe optical automation gain control circuit for an optical amplifier.	CO3- (8M)
		ii.	Explain the principle of operation of a semiconductor optical amplifier (SOA)?	CO3- (7M)
4.			**Unit-IV**	**12 M**
	A.	i.	How many forms of cross talk arises WDM system? And explain it briefly.	CO4- (8M)
		ii.	Give an account on the importance of isolators and circulators.	CO4- (7M)
			OR	
	B.	i.	Explain about reed-solomon codes for error detection and correction.	CO4- (8M)
		ii.	Describe power penalty in transmitter and receiver.	CO4- (7M)
5.			**Unit-V**	**15 M**
	A.	i.	What is WDM? Explain the principle with a neat block diagram.	CO5- (8M)
		ii.	Describe the Wavelength Stabilization against Temperature Variations in an optical network.	CO5- (7M)
			OR	
	B.	i.	Write short notes on the following Cross Phase Modulation	CO5- (8M)
		ii.	Optical Amplifiers	CO5- (7M)
			* * *	

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M.Tech., I Semester Regular Examinations JAN-2025(Model Paper)

Subject Name: Research Methodology and IPR

Time: 3 Hrs _____ Max. Marks: 75

S.no			Answer All Questions, One from each Unit Case Study is Compulsory	Marks
1.			**Unit-I**	**15 M**
	A.	i.	Write briefly about good Research criteria	CO1- (7M)
		ii.	What are the errors in selecting a research problem?	CO1- (8M)
			OR	
	B.	i.	Describe briefly the Research process with neat sketch	CO1- (15M)
			Unit-II	**15 M**
2.	A.	i.	Write briefly about Effective Literature studies approaches	CO2- (8M)
		ii.	Explain about Research ethics	CO2- (7M)
			OR	
	B.	i.	Write briefly about Effective technical writing	CO2- (8M)
		ii.	Explain about the Format of research proposal	CO2- (7M)
3.			**Unit-III**	**15 M**
	A.	i.	Write about the various steps in acquisition of trademarks rights	CO3- (8M)
		ii.	Explain the procedure for grants of patents	CO3- (7M)
			OR	
	B.	i.	Explain about patent information and databases	CO3- (15M)
4.			**Unit-IV**	**12 M**
	A.	i.	Write briefly about scope of patent rights.	CO4- (8M)
		ii.	Write briefly about Licensing and transfer of technology	CO4- (7M)
			OR	
	B.	i.	Write briefly about Administration in patent system	CO4- (15M)
5.			**Unit-V**	**15 M**
	A.	i.	Write briefly about New developments in IPR	CO5- (15M)

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M.Tech., I Semester Regular Examinations JAN-2025(Model Paper)

Subject Name: Radar Signal Processing

Time: 3 Hrs Max. Marks: 75

S.no			Answer All Questions, One from each Unit Case Study is Compulsory	Marks
1.			**Unit-I**	**15 M**
	A.	i.	Draw the block diagram of a Radar and Explain each block in detail.	CO1- (7M)
		ii.	Obtain the frequency response of a Matched filter with non-white noise.	CO1- (8M)
			OR	
	B.	i.	Discuss the efficiency of a non-matched filter.	CO1- (7M)
		ii.	Explain the role of beacon and repeater expressions in Radar.	CO1- (8M)
			Unit-II	**15 M**
2.	A.	i.	Explain the I/Q detector with a block diagram.	CO2- (8M)
		ii.	What is CFAR and explain average CFAR technique.	CO2- (7M)
			OR	
	B.	i.	Explain Likelihood-Ratio Receiver, Inverse Probability Receiver and Sequential Observer.	CO2- (8M)
		ii.	Discuss Radar Signal Management–Schematics.	CO2- (7M)
3.			**Unit-III**	**15 M**
	A.	i.	Obtain the ambiguity diagram for a pulse train consisting of five pulses.	CO3- (8M)
		ii.	Explain the optimization for detecting signals in clutter when the relative Doppler shift is zero or unknown.	CO3- (7M)
			OR	
	B.	i.	Discuss Waveform Design Requirements.	CO3- (8M)
		ii.	Write short note on Family of Radar Waveforms.	CO3- (7M)
4.			**Unit-IV**	**12 M**
	A.	i.	What are the advantages of the thumb lack ambiguity diagram and sketch the ideal thumb lack ambiguity diagram by a noise like waveforms.	CO4- (8M)
		ii.	Explain the basic principle of the linear FM pulse compression.	CO4- (7M)
			OR	
	B.	i.	Discuss the applications, advantages and disadvantages of short pulse in a radar.	CO4- (8M)
		ii.	Explain the SAW pulse compression in detail.	CO4- (7M)
5.			**Unit-V**	**15 M**
	A.	i.	Discuss the principle of the binary phase coded pulse compression.	CO5- (8M)
		ii.	Explain the properties of the frank poly phase codes.	CO5- (7M)
			OR	
	B.	i.	Write short note on Barker code.	CO5- (8M)
		ii.	Write short note on Maximal length sequences using PN codes.	CO5- (7M)
			* * *	

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M.Tech., I –II Semester Regular Examinations (Model Paper)

Subject Name: Advanced Computer Architecture

Time: 3 Hrs Max. Marks: 75

S.no			Answer All Questions, One from each Unit Case Study is Compulsory	Marks
1.			**Unit-I**	**15 M**
	A.	i.	Explain the terms – instruction format, instruction set, operands and addressing modes.	CO1- 15M
			OR	
	B.	i.	How Amdahl's law is useful for measurement of improved performance of computer systems?	CO1- 15M
			Unit-II	**15 M**
2.	A.	i.	Explain about various mapping procedures in the organization of cache memory.	CO2- (15M)
			OR	
	B.	i.	What is cache miss penalty? Explain with examples.	CO2- (15M)
3.			**Unit-III**	**15 M**
	A.	i.	Briefly explain basic VLIW approach.	CO3- (15M)
			OR	
	B.	i.	Describe the limitations of instruction level parallelism.	CO3- (15M)
4.			**Unit-IV**	**15 M**
	A.	i.	Explain multiprocessor cache coherence.	CO4- (15M)
			OR	
	B.	i.	Explain multithreading and thread level parallelism.	CO4- (15M)
5.			**Unit-V**	**15 M**
	A.	i.	Explain in detail practical issues in interconnecting networks.	CO5- (15M)
			OR	
	B.	i.	Explain Designing of clusters with example.	CO5- (15M)
			* * *	

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(AUTONOMOUS)

M.Tech., I-IISemesterRegular ExaminationsMAY-2025 (ModelPaper)

Subject Name: DSP PROCESSORS AND ARCHITECTURES

Time:3Hrs Max.Marks:75

S.no			AnswerAllQuestions,OnefromeachUnit Case Study is Compulsory	Marks
1.			**Unit-I**	**15M**
	A.	i.	Explain the necessity of FFT with respect to computational complexity.	CO1-(15M)
			OR	
	B.	i.	Draw and explain the block diagram of a Digital Signal-Processing system.	CO1-(15M)
			Unit-II	**15M**
2.	A.	i.	With neat sketch explain the computational building blocks of DSP.	CO2-(15M)
			OR	
	B.	i.	Discuss in brief about the data addressing capabilities of programmable DSP devices with examples.	CO2-(15M)
3.			**Unit-III**	**15M**
	A.	i.	With suitable example explain the pipeline operation in TMS 320C54XX processor.	CO3-(15M)
			OR	
		i.	Describe the following on-chip peripherals of TMS320C54xx processors with Hardware Timer.	CO3-(15M)
4.			**Unit-IV**	**15M**
	A.	i.	Explain the base architecture of ADSP 2181.	CO4-(15M)
			OR	
		i.	Explain the Bus Architecture of Black fin Processor.	CO4-(15M)
5.			**Unit-V**	**15M**
	A.	i.	What is the significance of interfacing? Explain the procedure to interface memory and I/O peripherals to programmable DSP devices.	CO5-(15M)
			OR	
	B.	i.	How does DMA help in increasing the processing speed of a DSP processor?	CO5-(15M)
			* * *	

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(AUTONOMOUS)

M.Tech.,I-IISemesterRegular ExaminationsMAY-2025(ModelPaper)

IMAGE AND VIDEO PROCESSING

Time:3Hrs Max.Marks:75

S.no			AnswerAllQuestions,OnefromeachUnit Case Study is Compulsory	Marks
1.			**Unit-I**	**15M**
	A.	i.	Explain image sampling and quantization	CO1-(15M)
			OR	
	B.	i.	Explain various image file formats	CO1-(15M)
			Unit-II	**15M**
2.	A.	i.	Explain the various spatial domain approaches for image enhancement	CO2-(15M)
			OR	
	B.	i.	Explain histogram equalization with an example	CO2-(15M)
3.			**Unit-III**	**15M**
	A.	i.	Explain Region based image segmentation	CO3-(15M)
			OR	
	B.	i.	Explain various redundancies in images and from that what is the need of image compression	CO3-(15M)
4.			**Unit-IV**	**15M**
	A.	i.	Explain the 3-D motion models.	CO4-(15M)
			OR	
	B.	i.	Explain the sampling of video signals	CO4-(15M)
5.			**Unit-V**	**15M**
	A.	i.	Elucidate the concept of Mesh based motion estimation	CO5-(15M)
			OR	
	B.	i.	Explain the general methodologies for motion estimation	CO5-(15M)
			* * *	

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H.T.No: | | | | | | | | | | |

Course Code: MT24DE1202

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

I M. Tech II Semester Regular/Supplementary Examinations

Wireless Communication and Networks

Time:3hours **Max.Marks:75**

1. Answer all the questions, One Question from each unit. Each question carries 15 Marks.

S. No.		(Answer All Questions, One Question from each unit)	Marks		
			BTL	CO	M
		UNIT - I	15 Marks		
1	a	Explain the various types of Handoff processes available	2	1	7
	b	Explain in detail about Trunking and Grade of Service	2	1	8
		OR			
2	a	Write short notes on channel assignment strategies	2	1	7
	b	Discuss briefly about frequency reuse	2	1	8
		UNIT - II	15 Marks		
3	a	Explain knife Edge Diffraction Model.	2	2	7
	b	With neat diagrams explain the Free Space Propagation Model	2	2	8
		OR			
4	a	Derive the Impulse response model ofa Multipath channel	3	2	7
	b	Discuss about Brewster angle	2	2	8
		UNIT - III	15 Marks		
5	a	Explain small scale fading.	2	3	7
	b	Discuss in detail different types of small-scale fading	2	3	8
		OR			
6	a	Discuss in detail about the factors that influence small scale fading.	2	3	7
	b	Discuss about fast fading and slow fading	2	3	8
		UNIT - IV	15 Marks		
7	a	Explain LMS and Recursive Least Square algorithm	2	4	7
	b	Derive the expression for Maximal Ratio Combining Improvement	3	4	8
		OR			
8	a	Explain in detail about Decision Feedback Equalization	2	4	7
	b	Derive the expression for Maximal Ratio Combining Improvement	3	4	8
		UNIT - V	15 Marks		
9	a	Draw and explain configuration of IEEE802.11 architecture.	2	5	7
	b	Explain the physical layer specications of IEEE802.11 using infrared	2	5	8
		OR			
10	a	Compare and contrast IEEE 802.11 a, b, g and n standards	5	5	7
	b	Discuss in detail about WLAN Topologies	2	5	8

Note: a long answer question may be split into two or three sub questions totaling fifteen marks or given as a single question worth of fifteen marks.

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Course Code: MT | DR24

D.N.R COLLEGE OF ENGINEERING& TECHNOLOGY

(AUTONOMOUS)

M.Tech, III Semester Regular Examinations (Model Paper)

Subject Name: Advanced Digital Signal Processing

Time: 3Hrs | Max. Marks: 75

S.no			Answer All Questions, One from each Unit Case Study is Compulsory	Marks
1.			**Unit-I**	**15 M**
	A.	i.	Using Decimation in Time algorithm find the FFT of x[n]={1,2,3,1,-1,3,-4}.	CO1- 15M
			OR	
	B.	i.	Describe the frequency domain description of an Interpolator.	CO1- 15M
			Unit-II	**15 M**
2.	A.	i.	Describe the over sampling A/D and D/A converters.	CO2- (15M)
			OR	
	B.	i.	Explain how sampling rate conversion of band pass signals can be achieved.	CO2- (15M)
3.			**Unit-III**	**15 M**
	A.	i.	Explain the blackmann and tukey method of smoothing the period gram.	CO3- (15M)
			OR	
	B.	i.	Discuss in brief about Bartlett method of power spectrum estimation.	CO3- (15M)
4.			**Unit-IV**	**15 M**
	A.	i.	What are the advantages of lattice structures?	CO4- (15M)
			OR	
	B.	i.	Explain lattice structures for IIR filters	CO4- (15M)
5.			**Unit-V**	**15 M**
	A.	i.	Explain the autocorrelation function with its properties.	CO5- (15M)
			OR	
	B.	i.	Describe the Yule-Walker method of power spectrum estimation.	CO5- (15M)
			* * *	

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

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

Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada
Accredited with A^{++} Grade by NAAC & Accredited by NBA (B. TECH – CSE, ECE & EEE)
Ph: 08816-221238 Email: dnrcet@gmail.com website: https://dnrcet.org

Bhimavaram,
27/06/25.

To

The Principal,

DNRCET,

Bhimavaram.

Sub: Proposal for Joint Add-On Courses organized by ECE and EEE Depts-reg.

Respected Sir,

I am writing to formally propose the introduction of **Add-On Courses** for ECE & EEE branch students in the upcoming academic year. These courses are designed to supplement the existing curriculum and equip students with additional skills that are aligned with current industry demands and technological trends.

The proposed Add-On Courses include:

1. **Embedded & IoT Training** – To introduce students to smart systems and practical hardware-software integration.
2. **Advanced VLSI Design and Verification Techniques** – To improve the students core knowledge and practical hardware-software integration.

These courses will be conducted and organized in collaboration with **industry experts, certified trainers and faculty members**. Certification will be provided to students upon successful completion, which will be beneficial for their higher studies, internships and placements. I kindly requesting to initiate the process of organizing these Add-On Courses.

Note: These titles may change as per the students requirements.

Thanking you Sir,

Yours Sincerely,

(Dr.KBVSR Subrahmanyam)
Prof.&HOD,EEE

(Dr.K.Venugopal) 27/6/25
Assoc.Prof and HOD, ECE

(Principal) 27/6.

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Bhimavaram,

27/06/25.

To

The Principal,

DNRCET,

Bhimavaram.

Sub: Proposal for jointly organizing FDPs by ECE and EEE Depts-reg.

Respected Sir,

I am writing to formally propose the FDPs for ECE & EEE branch students in the upcoming academic year. This will equip the faculty with additional skills and gain knowledge that are aligned with current industry demands and technological trends.

Thc proposed FDPs include:

1. **Embedded systems & IoT**
2. **Edge Computing and IoT in modern communication networks**
3. These FDPs will be conducted and organized in collaboration with **industry experts, certified trainers and faculty members**. Certification will be provided to Faculty upon successful completion, which will be beneficial for their career growth. I kindly requesting to initiate the process of organizing these FDPs.

Note: These titles may change as per the faculty requirements.

Thanking you Sir,

Yours Sincerely,

(Dr.KBVSR Subrahmanyam)
Prof.&HOD,EEE

(Dr.K.Venugopal)
Assoc.Prof and HOD, ECE