INSTITUTE VISION

To be a preferred institution in Engineering Education by achieving excellence in teaching and research and to remain as a source of pride for its commitment to holistic development of individual and society.

INSTITUTE MISSION

To continuously strive for the overall development of students, educating them in a state of the art infrastructure, by retaining the best practices, people and inspire them to imbibe real time problem solving skills, leadership qualities, human values and societal commitments, so that they emerge as competent professionals.

DEPARTMENT VISION

To be a centre of excellence in teaching and learning to produce the competent & socially responsible professionals in the domain of Electrical & Electronics Engineering.

DEPARTMENT MISSION

I. To educate students with core knowledge of Electrical and Electronics Engineering to excel in their professional career.

II. To develop problem solving skills, professional skills and ethical values among the students for the betterment of mankind.

III. To prepare technically competent and socially responsible Electrical Engineer to serve the future needs of the society.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

Graduates of the program will be able to

PEO1: Achieve successful professional career in Electrical Engineering and allied disciplines.

PEO2: Pursue higher studies and continuously engage in upgrading the professional skills.

PEO3: Demonstrate professional & ethical values, effective communication skills and teamwork to solve issues related to profession, society and environment.

PROGRAM OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs) :

PSO1: Apply knowledge & competencies to analyze & design Electrical & Electronics Circuits, Controls and Power Systems, Machines & Industrial Drives.

PSO2: Use Software/Hardware tools for the design, simulation and analysis of Electrical and Electronics Systems.

Contents of VI-SEM

1.0 Student Help Desk

Sl. No	Coordination Work	Contact Person	
		Faculty	Instructor
01	Attestations	Dr. B. V. Madiggond	-
02	Exam forms signature, Overall department administration, Counseling/interaction with Parents/Students.		
03	Research Centre Coordinator, Academic Coordinator		
04	Project Coordinator, KSCST Coordinator, Hobby & Mini Project Coordinator	Prof. S. D. Hirekodi	-
05	Mentorship Coordinator, GATE Coaching Coordinator	Prof. H. R. Zinage	-
06	Dept. Association Coordinator, Seminar Coordinator	Prof. S. G. Huddar	-
07	Website Coordinator, Professional Body (ISTE & IEEE) Coordinator, Alumni Coordinator	Prof. O. B. Heddurshetti	-
08	AICTE/VTU/NIRF Coordinator, Dept. News & Publicity Coordinator, AICTE Activity Coordinator	Prof. A. U. Neshti	-
10	Library Coordinator	Prof. A. U. Neshti	Shri. S. B. Beelur
11	IA & EMS Coordinator	Prof. K. B. Negalur	-
12	First Year Coordinator, News letter/Technical Magazine Coordinator	Prof. M. P. Yenagimath	-
14	TP Cell Coordinator, IIIC Cell, Internship Coordinator	Prof. P. I. Savadatti	--
13	Dispensary	Dr. Arun G. Bullannavar, Contact No. 9449141549	
Class Teacher			
15	4th Semester	Prof. A. U. Neshti	Shri. S. B. Beelur
16	6th Semester	Prof. O. B. Heddurshetti	Shri. V. M. Mutalik
17	8th Semester	Prof. H. R. Zinage	Shri. R. S. Bardol

2.0 Departmental Resources

Department of Electrical and Electronics Engineering was established in the year 1996 and is housedin a total area of **1339 Sq. Mtrs.**

2.1 Faculty Position

S.N.	Category	No. in position	Average experience
1	Teaching faculty	10	18 Y
2	Technical supporting staff	3	26 Y
3	Helper	2	20 Y

2.2 Major Laboratories

SL. No.	Name of the laboratory	Area in Sq. Mtrs	Amount Invested (Rs)
01	Electronics Lab	71	4,49,488.00
02	Operational Amplifier & Linear Integrated Lab		1,29,776.00
03	Power Electronics Lab	92	7,85,162.00
04	Control Systems Lab		2,14,127.00
05	Power System Simulation Lab	71	17,95,111.00
06	Computer Aided Electrical Drawing Lab		6,50,988.40
07	Microcontroller Lab / Digital Signal Processing Lab	72	5,94,122.00
09	Electrical Machines Lab	200	14,85,725.0
10	Relay & High Voltage Lab	94	11,72,383.00
11	Basic Electrical Engg. Lab	96	42,321.00
	Total	**696**	73,19,203.40

3.0 Faculty Details

S.N.	Faculty Name	Designation	Qualification	Area of specialization	Professional membership	Industry Experience (in years)	Teaching Experience (in years)	Contact Nos.
01	Dr. B. V. Madiggond	HOD/Prof.	Ph. D	Power Electronics	LMISTE, YHAI	-	30	9343454993
02	Prof. V. B. Dhere	Asst. Prof.	M. Tech, (Ph. D)	Electronics & Telecommunication	LMISTE, IMPARC	4	26	9886597573
03	Prof. S. D. Hirekodi	Asst. Prof.	M. Tech.	Power Electronics	LMISTE	1	23	9480849338
04	Prof. H. R. Zinage	Asst. Prof.	M. Tech.	Power System	LMISTE	-	23	9480849335
05	Prof. M. P. Yenagimath	Asst. Prof.	M. Tech (Ph. D)	VLSI & ES	LMISTE	1	17.5	9341449466
06	Prof. O. B. Heddurshetti	Asst. Prof.	M. Tech.	Power Electrics	LMISTE	1	16	9448420509
07	Prof. A. U. Neshti	Asst. Prof.	M. Tech.	Digital Electronics	ISTE	-	15	9538223362
08	Prof. K. B. Neglur	Asst. Prof.	M. Tech.	Industrial Electronics	LMISTE	-	10	9886644507
09	Prof. S. G. Huddar	Asst. Prof.	M. Tech.	Power System Engg.	LMISTE	-	10	9742066852
10	Prof. P. I. Savadatti	Asst. Prof.	M. Tech.	Digital Electronics	-	-	08	9964315436

4.0 Institute Academic Calendar

S J P N Trust's
Hirasugar Institute of Technology, Nidasoshi.
Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi
Recognized under 2(f) & 12B of UGC Act, 1956
Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA:CSE & ECE

IQAC | File I-11 | AY:2023-24 (Even) | Rev: 01

ACADEMIC CALENDAR OF EVENTS-02 (CoE-02) OF IV& VI SEMs FOR THE AY: 2023-24

Ref: 1) VTU CoE Revised Notification No.: VTU/BGM/AC-MBA/2023-24/6901, Dated 27th March 2024
2) VTU Tentative Academic Calendar Notification No.: VTU/BOS/AC-PG-6th sem BE/2023-24 /239, Dated 15th April 2024

April -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May-2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June-2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

July-2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

August-2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Date	Events & Holidays
2nd April 2024	Technovision-24
9th April 2024	GH: Yugadi Festival
11th April 2024	GH: Kutub-A-Ramjan
22nd April, 2024	Commencement of IV Semester Classes
29th April, 2024	Commencement of VI Semester Classes
30th April 2024	Institute Sports Events
1st May 2024	GH: Labours Day
7th May 2024	GH: Lok Sabha Election
2nd -6th May 2024	Fun Week (Social & Cultural Activities)
8th May 2024	HSIT Shambhrama-24 & World- Red-Cross Day
9th May 2024	Graduation Day-24
10th May 2024	GH: Basav Jayanti/Akhsay Trutiya
13th May 2024	Final Year Project Exhibition
29th -31st May 2024	1st IA Test for IV & VI Sems.
31st May 2024	1st Feedback on Teaching-Learning (IV & VI Sems.)
5th June 2024	Display of 1st IA Test Marks of IV & VI Sems.
21st -22nd June 2024	Lab IA Test-I (IV & VI Sem. 2021 & 2022 Schemes)
21st June 2024	International Yoga Day
27th -29th June 2024	2nd IA Test for IV & VI Sems.
29th June 2024	2nd Feedback on Teaching-Learning (IV & VI Sems.)
3rd July 2024	Display of 1st IA Test Marks of IV & VI Sems.
17th June 2024	GH: Bakreed
3rd July 2024	International Plastic Bag Free Day
11th July 2024	World Population Day
15th July 2024	World Youth Skills Day
17th July 2024	GH: Last Day of Moharam
25th -27th July 2024	3rd IA Test for IV & VI Sems.
28th July 2024	World Nature Conservation Day
30th July 2024	Display of 3rd IA Test Marks of IV & VI Sems.
29th -30th July 2024	Lab IA Test-II (IV & VI Sem. 2021 & 2022 Schemes)
31st July 2024	Last Working Day of the VI Semester Classes
7th August 2024	Last Working Day of the IV Semester Classes
12th August 2024	International Youth Day
15th August 2024	GH: Independence Day Celebration
8th -17th August 2024	VTU IV Sem Practical Examinations
19th Aug. -12th Sept. 2024	VTU IV Sem Theory Examinations
1st -10th August 2024	VTU VI Sem Practical Examinations
12th Aug. -14th Sept. 2024	VTU VI Sem Theory Examinations
20th August 2024	Sadbhavna Diwas
26th August 2024	Women's Equality Day
16th Sept. 2024	Commencement of V Sem of AY: 2024-25

GH: General Holiday, LH: Local Holiday

Dr.S.N.Topannavar
IQAC Coordinator & Dean (Academics)

Dr.S.C.Kamate
Principal

Nidasoshi, Taq: Hukkeri, Dist: Belagavi, Karnataka - 591 236
Phone:+91-8333-278887, Fax:27[illegible], Web:www.hsit.ac.in, Mail:principal@hsit.ac.in

Page 1 of 2

5.0 Department Academic Calendar

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Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA:CSE & ECE

EEE
COE
2023-24 (Even)
Rev: 00

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGG.
CALENDAR OF EVENTS FOR THE IV & VI SEMESTER 2023-24 (Even)

Calendar

April -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

July -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	12
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

August -2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29		

Date	Events & Holidays
2nd April 2024	Technovision-24
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1st May 2024	GH: Labours Day
3rd May 2024	Fun Week-HSIT Shambhrama-24
7th May 2024	GH: LokSabha Election
8th May 2024	GraduationDay-24 & World Red Cross Day
9th May 2024	Final Year Project Exhibition
10th May 2024	GH: Basav Jayanti/Akhsay Trutiya
13th May 2024	Project Exhibition for VIII Sem
17th May 2024	Poster Presentation
24th May 2024	Speech Competition
29th -31st May 2024	1st IA Test for IV & VI Sem.
31st May 2024	1st Feedback on Teaching-Learning (IV & VI Sem)
5th June 2024	Display of 1st IA Test Marks of IV & VI Sem.
7th June 2024	Group Discussion
14th June 2024	Pick & Speak Competition
17th June 2024	GH: Bakreed
21st - 22nd June 2024	Lab IA Test-I (IV&VISem.2021 & 2022 Schemes)
21st June 2024	International Yoga Day
27th-29th June 2024	2nd IA Test for IV & VI Sems.
29th June 2024	2nd Feedback on Teaching-Learning (IV & VI Sem)
3rd July 2024	Display of 1st IA Test Marks of IV & VI Sem
5th July 2024	Mehandi Competition
12th July 2024	Face Painting Competition
3rd July 2024	International Plastic Bag Free Day
11th July 2024	World Population Day
15th July 2024	World Youth Skills Day
17th July 2024	GH: Last Day of Moharam
19th July 2024	Hair Style Competition
25th-27th July 2024	3rd IA Test for IV& VI Sem
28th July 2024	World Nature Conservation Day
30th July 2024	Display of 3rdIA Test Marks of IV & VI Sem
29th -30th July 2024	Lab IA Test-II (IV & VI Sem 2021 & 2022 Schemes)
31st July 2024	Last Working Day of the VI Semester Classes
7th August 2024	Last Working Day of the IV Semester Classes
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15th August 2024	GH: Independence Day Celebration
8th-17th August 2024	VTU IV Sem Practical Examinations
19th Aug.-12th Sept. 2024	VTU IV Sem Theory Examinations
1st-10th August 2024	VTU VI Sem Practical Examinations
12th Aug.-14th Sept. 2024	VTU VI Sem Theory Examinations
20th August 2024	Sadbhavna Diwas
26th August 2024	Women's Equality Day
16th September 2024	Commencement of V Sem of AY: 2024-25

GH: General Holiday, LH: Local Holiday

Smt. S. G.Huddar
EESSA Coordinator

25.5.24
Dr. B. V. Madiggond
HOD

23/5/24
Dr. S. C. Kamate
Principal

Nidasoshi, Taq: Hukkeri, Dist: Belgaum, Karnataka - 591 236
Phone:+91-8333-278887, Fax:278886, Web: www.hsit.ac.in, Mail: principal@hsit.ac.in

6.0 Scheme of Teaching & Examination

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
B.E. in Electrical and Electronic Engineering
Scheme of Teaching and Examinations 2021
Outcome-Based Education(OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2021 - 22)

VI SEMESTER

Sl. No	Course and Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board	Teaching Hours /Week				Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	S					
1	HSMC 21EE61	Management and Entrepreneurship	HSME/EE	3	0	0		03	50	50	100	3
2	IPCC 21EE62	Power System Analysis - 2	EE	3	0	2		03	50	50	100	4
3	PCC 21EE63	Signals and Digital Signal Processing	EE	2	2	0		03	50	50	100	3
4	PEC 21EE64x	Professional Elective Course-I	EE	3	0	0		03	50	50	100	3
5	OEC 21EE65x	Open Elective Course-I	Concerned Department	3	0	0		03	50	50	100	3
6	PCC 21EEL66	Digital Signal Processing Laboratory	EE	0	0	2		03	50	50	100	1
7	MP 21EEMP67	Mini Project	EE	Two contact hours /week for interaction between the faculty and students.				--	100	--	100	2
8	INT 21INT68	Innovation/Entrepreneurship /Societal Internship	Completed during the intervening period of IV and V semesters.					--	100	--	100	3
								Total	**500**	**300**	**800**	**22**

Professional Elective - I

21EE641	Sensors and Transducers	21EE643	Electrical Machine Design
21EE642	Electromagnetic Field Theory	21EE644	Electrical Engineering Materials

Open Electives – I offered by the Department of Electrical and Electronics Engineering to other Department students

21EE651	Utilization of Electrical Power	21EE653	Industrial Servo Control Systems
21EE652	Renewable Energy Resources	21EE654	Advanced Control Systems

Note: HSMC: Humanity and Social Science & Management Courses, **IPCC:** Integrated Professional Core Course, **PCC:** Professional Core Course, **PEC:** Professional Elective Courses, O**EC**–Open Elective Course, **MP** –Mini Project, INT –Internship.
L –Lecture, T – Tutorial, P - Practical / Drawing, S – Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (BE/B.Tech) 2021-22 may be referred.

Professional Elective Courses(PEC):
A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum students' strength for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the programme is less than 10.

Open Elective Courses:

Students belonging to a particular stream of Engineering and Technology are not entitled for the open electives offered by their parent Department. However, they can opt an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor.

Selection of an open elective shall not be allowed if,

(i) The candidate has studied the same course during the previous semesters of the program.

(ii) The syllabus content of open electives is similar to that of the Departmental core courses or professional electives.

(iii) A similar course, under any category, is prescribed in the higher semesters of the program.

In case, any college is desirous of offering a course (not included in the Open Elective List of the University) from streams such as Law, Business (MBA), Medicine, Arts, Commerce, etc., can seek permission, at least one month before the commencement of the semester, from the University by submitting a copy of the syllabus along with the details of expertise available to teach the same in the college.

The minimum students' strength for offering open electives is 10. However, this conditional shall not be applicable to cases where the admission to the programme is less than 10.

Mini-project work: Mini Project is a laboratory-oriented course which will provide a platform to students to enhance their practical knowledgeand skills by the development of small systems/applications.

Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini- project can beassigned to an individual student or to a group having not more than 4 students.

CIE procedure for Mini-project:

(i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of project report, project presentation skill, and question and answer session in the ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

(ii) Interdisciplinary: Continuous Internal Evaluation shall be group-wise at the college level with the participation of all the guides of the project.

The CIE marks awarded for the Mini-project, shall be based on the evaluation of project report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

No SEE component for Mini-Project.

Subject Title	**MANAGEMENT AND ENTREPRENEURSHIP**		
Subject Code	21EE61	**CIE Marks**	50
Number of Lecture Hrs / Week	03	**SEE Marks**	50
Total Number of Lecture Hrs	40	**Exam Hours**	03
			CREDITS – 03

FACULTY DETAILS:		
Name: Prof: Hemalata R Zinage	**Designation:** Asst. Professor	**Experience: 23** Years
No. of times course taught: 03	**Specialization:** Power system	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
--	--	--	--

2.0 Course Objectives

1. To introduce the field of management, task of the manager, importance of planning and types of planning, staff recruitment and selection process.
2. To discuss the ways in which work is allocation, structure of organizations, modes of communication and importance of managerial control in business.
3. To explain need of coordination between the manager and staff, the social responsibility of business and leadership.
4. To explain the role and importance of the entrepreneur in economic development and the concepts of entrepreneurship.
5. To explain various types of entrepreneurs and their functions, the myths of entrepreneurship and the factors required for capacity building for entrepreneurs
6. To discuss the importance of Small Scale Industries and the related terms and problems involved.
7. To discuss methods for generating new business ideas and business opportunities in India and the importance of business plan.
8. To introduce the concepts of project management and discuss capitol building process.
9. To explain project feasibility study and project appraisal and discuss project financing
10. To discuss about different institutions at state and central levels supporting business enterprises.

3.0 Course Outcomes

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

	Course Outcome	RBT Level	Pos
C301.1	Explain the field of management, task of the manager, planning and steps in decision making.	L2	6-12
C301.2	Discuss the structure of organization, importance of staffing, leadership styles, modes of communication techniques of coordination and importance of managerial control in business.	L2	6-12
C301.3	Explain the concepts of entrepreneurship and a businessman's social responsibilities towards different groups.	L2	6-12
C301.4	Explain the social responsibility of business and leadership and discuss role of SSI's in the development of country and state/central level ,institutions/agencies supporting business enterprises.	L2	6-12
C301.5	Discuss the concepts of project management, capital budgeting, project feasibility studies, need for project report and new control techniques	L2	6-12
Total Hours of instruction		**40**	

4.0 Course Content

Module-1

Management: Definition, Importance – Nature and Characteristics of Management, Management Functions, Roles of Manager, Levels of Management, Managerial Skills, Management & Administration, Management as a Science, Art &Profession**.**

Planning: Nature, Importance and Purpose Of Planning, Types of Plans, Steps in Planning, Limitations of Planning, Decision Making – Meaning, Types of Decisions- Steps in Decision Making.

Module-2

Organizing and Staffing: Meaning, Nature and Characteristics of Organization – Process of Organization, Principles of Organization, Departmentalization, Committees – meaning, Types of Committees, Centralization Versus Decentralization of Authority and Responsibility, Span of Control (Definition only), Nature and Importance of Staffing, Process of Selection and Recruitment.

Directing and Controlling: Meaning and Nature of Directing-Leadership Styles, Motivation Theories Communication – Meaning and Importance, Coordination- Meaning and Importance, Techniques of Coordination. Controlling – Meaning, Steps in Controlling

Module-3

Social Responsibilities of Business: Meaning of Social Responsibility, Social Responsibilities of Business towards Different Groups, Social Audit, Business Ethics and Corporate Governance.

Entrepreneurship:

Definition of Entrepreneur, Importance of Entrepreneurship, concepts of Entrepreneurship, Characteristics of successful Entrepreneur, Classification of Entrepreneurs, Intrapreneur – An Emerging Class, Comparison between Entrepreneur and Intrapreneur, Myths of Entrepreneurship, Entrepreneurial Development models, Entrepreneurial development cycle, Problems faced by Entrepreneurs and capacity building for Entreprenership.

Module-4

Modern Small Business Enterprises: Role of Small Scale Industries, Concepts and definitions of SSI Enterprises, Government policy and development of the Small Scale sector in India, Growth and Performance of Small Scale Industries in India, Sickness in SSI sector, Problems for Small Scale Industries, Impact of Globalization on SSI, Impact of WTO/GATT on SSIs, Ancillary Industry and Tiny Industry (Definition only).

Institutional Support for Business Enterprises: Introduction, Policies & Schemes of Central–Level Institutions, State-Level Institutions.

Module-5

Project Management: Meaning of Project, Project Objectives & Characteristics, Project Identification Meaning & Importance; Project Life Cycle, Project Scheduling, Capital Budgeting, Generating an Investment Project Proposal, Project Report-Need and Significance of Report, Contents, Formulation, Project Analysis Market, Technical, Financial, Economic, Ecological, Project Evaluation and Selection, Project Financing, Project Implementation Phase, Human & Administrative aspects of Project Management, Prerequisites for Successful Project Implementation. New Control Techniques- PERT and CPM, Steps involved in developing the network, Uses and Limitations of PERT and CPM.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	VIII	Project work	Project building

6.0 Relevance to Real World

Sl No	Real World Mapping
01	Planning in an industry
02	Various organizational structures
03	Development of a project cases

7.0 Gap Analysis and Mitigation

Sl No	Delivery Type	Details
01	Activity	Group discussion on a trending topic to build communication skills.

8.0 Books Used and Recommended to Students

Text Books

1.	Principles of Management	P.C. Tripathi, P.N.Reddy	McGraw Hill,	6th Edition, 2017
2.	Entrepreneurship Development and Small Business Enterprises	Poornima M. Charanthimath	Pearson	2nd Edition,2014

Reference Books

1. Dynamics of Entrepreneurial Development and Management Vasant Desai Himalaya Publishing House 2007
2. Essentials of Management: An International, Innovation and Leadership perspective Harold Koontz, Heinz Weihrich McGraw Hill 10th Edition 2016

Additional Study material & e-Books

1.Iyer, P.P., Engineering Project Management with Case Studies, Vikas Publishing, New Delhi, 2009.
2.Zikmund, W.G., Business Research Methods, 5th Edition, New York, The Dryden Press, Harcount Publishers, 1997.
3.M Govindarajan and S. Natarajan, Principles of Management, Eastern Economy Edition, 2005.

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

1) https://ocw.mit.edu/courses/sloan-school-of-management/15-390-new-enterprises-spring-2013/video-tutorials/lecture-1/
2) https://ocw.mit.edu/courses/sloan-school-of-management/15-390-new-enterprises-spring-2013/video-tutorials/lecture-2/
3) https://ocw.mit.edu/courses/sloan-school-of-management/15-390-new-enterprises-spring-2013/video-tutorials/lecture-4/
4) https://ocw.mit.edu/courses/sloan-school-of-management/15-390-new-enterprises-spring-2013/video-tutorials/lecture-5/

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	Academy of management journal	http://libguides.usc.edu.au
2	International journal of economics and financial review	http://www.sciencedirect.com/science/journal/00207683
3	International journal of human resource management.	http://libguides.usc.edu.au

11.0 Examination Note

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation: Three Unit Tests each of 20 Marks (duration 01 hour) First test at the end of 5th week of the semester

- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester
- Two assignments each of 10 Marks
  First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester
- Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours) At the end of the 13th week of the semester
- The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).
  CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
1	1.	**Management:** Definition, Importance – Nature and Characteristics of Management,	20
	2.	Management Functions, Roles of Manager,	
	3.	Levels of Management, Managerial Skills,	
	4.	Management & Administration, Management as a Science, Art & Profession	
	5.	**Planning:** Nature, Importance and Purpose Of Planning	
	6.	Types of Plans, Steps in Planning	
	7.	Limitations of Planning, Decision Making – Meaning	
	8.	Types of Decisions- Steps in Decision Making.	
2	9.	**Organizing:** Meaning, Nature and Characteristics of Organization – Process of Organization	20
	10.	Principles of Organization, Departmentalisation	
	11.	Committees –meaning, Types of Committees, Centralization Vs Decentralization of Authority and Responsibility, Span of Control (Definition only)	
	12.	**Staffing:** Nature and Importance of Staffing, Process of Selection and Recruitment.	
	13.	**Directing:** Meaning and Nature of Directing-Leadership Styles	
	14.	Motivation Theories Communication – Meaning and Importance	
	15.	Coordination- Meaning and Importance, Techniques of Coordination	
	16.	**Controlling –** Meaning, Steps in Controlling.	
3	17.	**Social Responsibilities of Business:** Meaning of Social Responsibility	20
	18.	Social Responsibilities of Business towards Different Groups	
	19.	Social Audit, Business Ethics and Corporate Governance.	
	20.	**Entrepreneurship**: Definition of Entrepreneur, Importance of Entrepreneurship	
	21.	concepts of Entrepreneurship, Characteristics of successful Entrepreneur	
	22.	Classification of Entrepreneurs, Intrapreneur – An Emerging Class, Comparison between Entrepreneur and Intrapreneur	
	23.	Myths of Entrepreneurship, Entrepreneurial Development models, Entrepreneurial development cycle	
	24.	Problems faced by Entrepreneurs and capacity building for Entrepreneurship.	
4	25.	**Modern Small Business Enterprises:** Role of Small Scale Industries	20
	26.	Concepts and definitions of SSI Enterprises , Government policy and development of the Small Scale sector in India	
	27.	Growth and Performance of Small Scale Industries in India	
	28.	Sickness in SSI sector, Problems for Small Scale Industries	
	29.	Impact of Globalization on SSI, Impact of WTO/GATT on SSIs	
	30.	Ancillary Industry and Tiny Industry (Definition only).	
	31.	**Institutional Support for Business Enterprises:** Introduction, Policies & Schemes of Central–Level Institutions	
	32.	State-Level Institutions.	

5	33.	**Project Management:** Meaning of Project, Project Objectives & Characteristics	20
	34.	Project Identification- Meaning & Importance;	
	35.	Project Life Cycle, Project Scheduling, Capital Budgeting, Generating an Investment Project Proposal	
	36.	Project Report-Need and Significance of Report, Contents, Formulation	
	37.	Project Analysis-Market, Technical, Financial, Economic, Ecological	
	38.	Project Evaluation and Selection, Project Financing, Project Implementation Phase, Human & Administrative aspects of Project Management, Prerequisites for Successful Project Implementation.	
	39.	New Control Techniques- PERT and CPM	
	40.	Steps involved in developing the network, Uses and Limitations of PERT and CPM	

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl. No	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on management & Planning.	Students study the Topic and write the Answers. Get practice to solve university questions.	module 2of the syllabus	2	Individual Activity. Written answers are expected.	Text book 1
2	Assignment 2: University Questions on organizing, staffing, directing & controlling.	Students study the Topic and write the Answers. Get practice to solve university questions.	module 4 of the syllabus	4	Individual Activity. Written answers are expected.	Text book 1

14.0 QUESTION BANK

MODULE 1

1. Explain management –A science, art or profession?
2. Bring out the differences between management and administration.
3. Define management and describe the functions of the management.
4. What are the roles of manager? Explain.
5. Explain various functions of management.
6. Explain the different levels of management.
7. Explain various roles of management.
8. Explain modern management approaches.
9. Explain scientific management.
10. Is management is science or an art? Explain.
11. Explain various functional areas of management.
12. What is scientific management? Explain Taylor's scientific principles of management.
13. Explain contributions of FW Taylor's to the development of management thought.
14. Explain different milestones in development of management thought.
15. What are contributions of Henry Fayol? Explain.
16. Explain the principles of management.
17. Explain early management approaches.
18. Explain behavior approach to management.
19. Explain quantitative approach to management.
20. Explain the levels & Roles of Management.
21. What is contingency approach? Explain.
22. Define the term planning and explain its importance.

23. Explain the importance of planning. Mention its limitations.
24. What are the major drawbacks in planning? Explain.
25. Explain the significance of planning and its influence on other managerial functions.
26. Explain principles of planning.
27. What are the planning premises? Explain the classification of planning premises with examples.
28. What are the key features of planning?
29. Explain steps involved in planning.
30. Classify plans on the basis of hierarchy level at which plans are made.
31. Differentiate between strategic and operational plans.
32. What are single use and standing plans? Explain with examples.
33. What are objectives? Explain characteristic of objectives.
34. Explain importance of objectives.
35. Define the objectives. Discuss the characteristics of business objectives.
36. Briefly explain the types of planning.

MODULE 2

1. Define the term organization. Explain the purpose of organization.
2. Explain different types of organizations.
3. Explain the process of selection and recruitment.
4. Difference between formal and informal organization.
5. What is organizing? Explain the steps involved in organizing.
6. Explain the nature and purpose of an organization.
7. Explain the principles of organization.
8. What is an organization chart? What is line organization? Explain.
9. What is functional organization? Explain.
10. Differentiate between line and functional organization.
11. What is line and staff organization? Explain.
12. What are committees? Explain principles of committees.
13. What is committee organization?
14. What is directing? Explain the importance of directing.
15. Explain the behavioral approach of leadership style
16. Define the term leadership. Explain the qualities of a good leader.
17. Differentiate between managers and leaders.
18. Explain the nature and importance of staffing.
19. What are the various elements of staffing? Explain
20. Explain the techniques of selection.
21. Differentiate between recruitment and selection.
22. What is recruitment? Explain various sources of recruitment.
23. Explain the essentials of sound control system.
24. State and explain steps in controlling.
25. What is controlling? Explain its importance.
26. What are the different types of steps involved in controlling process?
27. Explain how controlling is related to planning.
28. Explain principles of controlling.
29. Discuss the process of controlling.
30. Briefly explain comparison of Maslow's and Herzberg theories of human motivation.
31. What do you mean by charismatic leadership?
32. Differentiate between transactional and transformational leadership.
33. Differentiate between autocratic and democratic styles of leadership.
34. What are the various techniques of coordination?
35. List various theories of leadership.
36. Are leaders made born? Justify.
37. Give principles of directing. Differentiate between autocratic, participative and free-rein styles of leadership. June 2010
38. What is trait theory of leadership? Explain.
39. What is managerial grid? Explain.
40. What is contingency theory of leadership? Explain Fielder's model.
41. Define the term motivation and explain its importance.
42. What is two factor theory? Explain.
43. Discuss McGregor's theory X and theory Y.
44. Compare different theories of motivation.

45. What is communication? Explain its importance.
46. Explain different types of communication.
47. What are barriers to communication? Explain.
48. What is coordination? Explain the need of coordination.

MODULE 3

1. Define entrepreneurship. Explain the functions of entrepreneur.
2. Write and explain types of entrepreneur.
3. Who is an entrepreneur and how is he different from a businessman?
4. Differentiate entrepreneur and entrepreneurship.
5. Tabulate the changing definition of entrepreneur and entrepreneurship.
6. Discuss the characteristics of entrepreneurs.
7. Discuss in detail how entrepreneurs view risk.
8. Describe the entrepreneurial process.
9. Describe role of entrepreneurs in economic development.
10. Discuss the evolution and growth of industrial entrepreneurship in India.
11. Describe the various problems faced by entrepreneurs in promotion of their units.
12. Discuss the scope of entrepreneurship in India.
13. Who are intrapreneur? Explain the difference between entrepreneurs and intrapreneur.
14. Explain evolution of entrepreneurship.
15. Explain the difference between entrepreneurs, intrapreneurs and managers.
16. Explain the types of entrepreneur.
17. What are the barriers of entrepreneurship?.
18. Define Micro, small and medium enterprises.

MODULE 4

1. What are the steps evolved in starting SSI? Explain one of them.
2. What are the objectives of SSI? Explain.
3. Briefly write about government support to small scale enterprises, during five year plans.
4. Write a note on SIDBI and NSIC.
5. What is TECSOK? Explain the services offered by it.
6. What are objectives and functions of KIADB?
7. Write a note on SIDBI and NSIC.
8. Explain the objectives and functions of TECSOK and KIADB.
9. Explain the role of KIADB and services offered by it. Explain various functional units of KIADB.
10. Explain assistance provided by KSIMC.
11. Explain the various assistance provided by TECSOK and KSSIDC.
12. Write a note on DIC single window agency.
13. Explain various types of assistances provided by KSFC.
14. Write a note a on Prime Minister's Rozgar Yojana.
15. Explain services offered by MSME.
16. What is SIDBI? Explain the services offered by it and various types of assistances provides to Small enterprise. Dec 2011
17. Write a note on TECSOK, KIADB, KSSIDC, KSIMC, KSFC
18. Explain SIDO with its various activities.
19. Write a note on ICICI

MODULE 5

1. Define the term project. What are the features of a project?
2. Explain the project identification and project selection.
3. Explain the control variables of a project.
4. What is project management? What are the activities of project management?
5. Explain the need and significance of project report.
6. What is a project report? Why is it needed?
7. Explain the factors which are to be considered for preparation of a good project report.
8. What is project identification? Explain the sources of information for project identification.
9. What is project selection? Explain factors influencing it.
10. Explain the planning commission guidelines for preparing a project report.
11. List the various components of a project report. What is project appraisal?
12. What do you mean by project feasibility study? Explain.

13. Explain market feasibility study.
14. What is financial feasibility study? Explain.
15. Explain the phase of project identification with sources.
16. Explain technical feasibility analysis.
17. What is economic feasibility analysis?
18. Differentiate between PERT and CPM
19. Explain network analysis. What are the various techniques used for network analysis.
20. Explain PERT. What re its advantages and disadvantages.
21. Explain CPM. What re its advantages and disadvantages.

Prepared by	Checked by		
			
Prof. Hemalata R Zinage.	**Prof. S D Hirekodi**	**HOD**	**Principal**

Subject Title	**POWER SYSTEM ANALYSIS-2**		
Subject Code	21EE62	**CIE Marks**	50
Number of Lecture Hrs / Week	3:0:2:0	**SEE Marks**	50
Total Number of Lecture Hrs	40 hours Theory + 10 Lab slots	**Exam Hours**	03
		CREDITS – 04	

FACULTY DETAILS:		
Name: Prof. S.G.Huddar	**Designation:** Asst. Professor	**Experience:**10 Years
No. of times course taught:-02(including present)		**Specialization:** Power System Engineering

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Electrical and Electronics Engineering	I/II	Basic Electrical Engineering
02	Electrical and Electronics Engineering	III/IV	Electric Power Generation
03	Electrical and Electronics Engineering	V	Power system analysis &stability

2.0 Course Objectives

1. To explain formulation of network models and bus admittance matrix for solving load flow problems.
2. To discuss optimal operation of generators on a bus bar and optimum generation scheduling.
3. To explain symmetrical fault analysis and algorithm for short circuit studies.
4. To explain formulation of bus impedance matrix for the use in short circuit studies on power systems.
5. To explain numerical solution of swing equation for multi-machine stability

3.0 Course Outcomes

Having successfully completed this course, the student will be able to

	Course Outcome	RBT Level	POs
CO 313.1	Formulate network matrices and models for solving load flow problems.	L4	1,2,3,8,12
CO 313.2	Perform steady state power flow analysis of power systems using numerical iterative techniques.	L4	1,2,3,8,12
CO 313.3	Solve issues of economic load dispatch and unit commitment problems.	L4	1,2,3,8,12
CO 313.4	Analyze short circuit faults in power system networks using bus impedance matrix.	L4	1,2,3,8,12
CO 313.5	Apply Point by Point method and Runge Kutta Method to solve Swing Equation.	L4	1,2,3,8,12

4.0 Course Content

Module-1

Network Topology: Introduction and basic definitions of Elementary graph theory Tree, cut-set, loop analysis. Formation of Incidence Matrices. Primitive network- Impedance form and admittance form, Formation of Y Bus by Singular Transformation. Ybus by Inspection Method. Illustrative examples. **08 Hours**

Module-2

Load Flow Studies: Introduction, Classification of buses. Power flow equation, Operating Constraints, Data for Load flow, Gauss Seidal iterative method. Illustrative examples. **08 Hours**

Module-3

Load Flow Studies(continued) Newton-Raphson method derivation in Polar form, Fast decoupled load flow method, Flow charts of LFS methods. Comparison of Load Flow Methods. Illustrative examples. **08 Hours**

Module-4

Economic Operation of Power System: Introduction and Performance curves, Economic generation scheduling neglecting losses and generator limits, Economic generation scheduling including generator limits and neglecting losses, Economic dispatch including transmission losses, Derivation of transmission loss formula. Illustrative example.

Unit Commitment: Introduction, Constraints and unit commitment solution by prior list method and dynamic forward DP approach (Flow chart and Algorithm only). **08 Hours**

Module-5

Symmetrical Fault Analysis: Z Bus Formulation by Step by step building algorithm without mutual coupling between the elements by addition of link and addition of branch. Illustrative examples. Z bus Algorithm for Short Circuit Studies excluding numerical.T1 **Power System Stability**: Numerical Solution of Swing Equation by Point by Point method and Runge Kutta Method. Illustrative examples. **08 Hours**

Sl. NO	Experiments
1	Formation for symmetric π /T configuration for Verification of Determination of Efficiency andRegulation.
2	Determination of Power Angle Diagrams, Reluctance Power, Excitation, EMF and Regulation forSalient and Non-Salient Pole Synchronous Machines.
3	To obtain Swing Curve and to Determine Critical Clearing Time, Regulation, Inertia Constant/Line Parameters /Fault Location/Clearing Time/Pre-Fault Electrical Output for a Single Machine connected to Infinite Bus through a Pair of identical Transmission Lines Under 3-Phase Fault On One of the two Lines.
4	Y Bus Formation for Power Systems with and without Mutual Coupling, by Singular Transformationand Inspection Method.
5	Formation of Z Bus (without mutual coupling) using Z-Bus Building Algorithm.
6	Determination of Bus Currents, Bus Power and Line Flow for a Specified System Voltage.
7	Formation of Jacobian for a System not Exceeding 4 Buses in Polar Coordinates.
8	Load Flow Analysis using Gauss Siedel Method, NR Method and Fast Decoupled Method for Both PQ and PV Buses.
9	To Determine Fault Currents and Voltages in a Single Transmission Line System with Star-Delta Transformers at a Specified Location for LG and LLG faults by simulation.
10	Optimal Generation Scheduling for Thermal power plants by simulation.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
1	VIII	PSOC	ALL

6.0 Relevance to Real World

SL. No	Real World Mapping
01	Power system operation
02	Carryout load flow analysis
03	Power system stability studies

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Visit to power plant	Power system operation study

8.0 Books Used and Recommended to Students

Text Books
1. Modern Power System Analysis D P Kothari, I J Nagrath McGraw Hill 4th Edition, 2011
2. Computer Methods in Power Systems Analysis Glenn W. Stagg Ahmed H Ei – Abiad Scientific International Pvt. Ltd. 1st Edition, 2019
3. Power Generation Operation and Control Allen J Wood etal Wiley 2nd Edition,2016
Reference Books
1. Computer Techniques in Power System Analysis M.A. Pai McGraw Hill 2nd Edition, 2012
2. Power System Analysis Hadi Saadat McGraw Hill 2nd Edition, 2002
Additional Study material & e-Books
1. http://pdfstuff4u.com/ebook.php?id=1071881 2. http://sjbit.edu.in

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References
1. ieeexplore.ieee.org/document/152452/--
2. https://engineering.purdue.edu/jump/8cb309
3. nptel.iitg.ernet.in

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	Society of energy engineers and managers	www.energyprofesionals.in
2	IEEE Explore	ieeexplore.ieee.org/xpl/RecentIssue
3	Journal of Modern Power Systems and Clean Energy	www.springer.com

11.0 Examination Note

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. Theminimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

CIE for the theory component of IPCC

Two Tests each of **20 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semesterTwo

assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Scaled-down marks of two tests and two assignments added will be CIE marks for the theory component of IPCC for 30 Marks.

CIE for the practical component of IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The**15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test **(duration 03 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted **for 50 marks** and scaled down to **05 marks.**

  Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **20 marks**.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled time table, with common question papers for the course (duration of 3 hours)

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximumof 3 sub-questions), **should have a mix of topics** under that module.
- The students have to answer 5 full questions, selecting one full question from each module.

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have aCIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 04/05 questions to be set from the practicalcomponent of IPCC, the total marks of all questions should not be more than the 20 marks.

- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

12.0 Course Delivery Plan

UNIT No.	Lecture No.	Content of Lecture	% of Portion
I	1.	**Network Topology**: Introduction and basic definitions of Elementary graph theory	20
	2.	Tree, cut-set, loop analysis.	
	3.	Formation of Incidence Matrices.	
	4.	Primitive network- Impedance form and admittance form.	
	5.	Formation of Y Bus by Singular Transformation.	
	6.	Ybus by Inspection Method.	
	7.	Illustrative examples.	
	8.	Illustrative examples.	
II	9.	**Load Flow Studies**: Introduction	20
	10.	Classification of buses.	
	11.	Power flow equation,	
	12.	Operating Constraints,	
	13.	Data for Load flow,	
	14.	Gauss Seidal iterative method.	
	15.	Gauss Seidal iterative method.	
	16.	Illustrative examples.	
III	17.	**Load Flow Studies(continued)** Introduction	20
	18.	Newton-Raphson method flowchart	
	19.	Newton-Raphson method derivation in Polar form	
	20.	Fast decoupled load flow method	

	21.	Flow charts of LFS methods.	
	22.	Comparison of Load Flow Methods.	
	23.	Illustrative examples.	
	24.	Illustrative examples.	
IV	25.	**Economic Operation of Power System:** Introduction and Performance curves.	**20**
	26.	Economic generation scheduling neglecting losses and generator limits	
	27.	Economic generation scheduling including generator limits and neglecting losses.	
	28.	Economic dispatch including transmission losses & Derivation of transmission loss formula.	
	29.	Illustrative examples.	
	30.	**Unit Commitment:** Introduction.	
	31.	Constraints and unit commitment solution by prior list method	
	32.	Dynamic forward DP approach (Flow chart and Algorithm only).	
V	33.	**Symmetrical Fault Analysis**: Z Bus Formulation	
	34.	Z bus formulation by Step by step building algorithm without mutual coupling between the elements by addition of link and addition of branch.	
	35.	Illustrative examples.	
	36.	Z bus Algorithm for Short Circuit Studies excluding numerical.	
	37.	**Power System Stability:** Numerical Solution of Swing Equation by Point by Point method	
	38.	Numerical Solution of Swing Equation by Runge Kutta Method.	
	39.	Illustrative examples.	
	40.	Illustrative examples.	

13.0 Assignments

Sl. No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment1: University Questions on network topology & load flow studies	Students study the Topics and write the Answers. Get practice to solve university Questions.	Module 1,2 & 3 of the syllabus	4	Individual Activity.	Book 1 of the Text book list. Website of the Reference list
2	Assignment 2: University Questions On economic operation of power system & symmetrical Fault analysis.	Students study the Topics and write the Answers. Get practice the problems.	Module 4 & 5 of the syllabus	9	Individual Activity.	Book 1 of the Text book list. Website of the Reference list

14.0 QUESTION BANK

Module -1

1. Define the following
   i. Graph
   ii. Sub-graph
   iii. Path
   iv. Tree
   v. Co-tree
   vi. Link
   vii. Cut set
   viii. Basic loop
2. Explain the following
   i. Explain element node incidence matrix
   ii. Explain bus incidence matrix
   iii. Explain branch path incidence matrix
   iv. Explain basic cutest incidence matrix
   v. Explain augmented cutest incidence matrix
   vi. Explain basic loop incidence matrix
   vii. Explain augmented loop incidence matrix
3. Explain about the primitive network in impedance and admittance form.
4. Explain the formation of Y_{Bus} by method of inspection.
5. Explain the formation of Y_{Bus} by method of singular transformation.
6. With usual notations, prove that $Y_{Bus}=A^T[y]\ A$ using singular transformation.
7. Determine YBus by singular transformation for the a system with data as follows

Element No	1	2	3	4	5
Bus code	0-1	1-2	2-3	3-0	2-0
Self admittance	1.4	1.6	2.4	2.0	1.8

Module -2

1. What are different types of buses considered during power system load flow analysis.
2. Explain G-S load flow solution procedure for a system having both PV & PQ buses. Derive the associated algorithmic expressions used for determining the unknown variables.
3. With the help of flow chart explain G-S method of load flow analysis
4. What are the advantages of Y_{Bus} based power flow analysis
5. The following is the system data for a load flow solution:

Bus code	Admittance
1-2	2.0 -j8.0
1-3	1.0 – j3.0
2-3	0.6 – j2.0
2-4	1.0 –j4.0
3-4	2.0 –j8.0

The schedule of active and reactive power is

a.	Bus code	P	Q	V	Remarks
b.	1	-	-	1.05+j0.0	Slack
c.	2	0.5	0.2	1.0+j0.0	PQ
d.	3	0.4	0.3	1.0+j0.0	PQ
e.	4	0.3	0.1	1.0+j0.0	PQ

Determine the voltage at the end of first iteration Using 1) Gauss – Seidal method,Take acceleration factor = 1.4

6. What is the need for acceleration factor?
7. What is Q-limit of generator?
8. Derive the expressions for power flow equations used in load flow analysis.

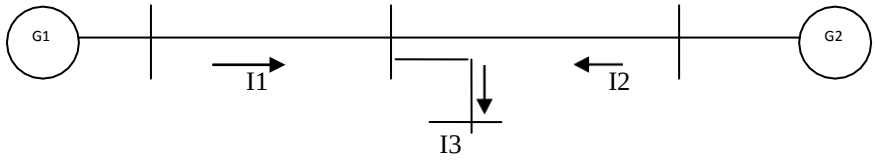
Module -3

1. Explain the significance of Jacobian matrix of N-R LF analysis.
2. With the help of flow chart, explain the procedure of fast decoupled load flow analysis.
3. What are all the approximations made in fast decoupled load flow solution?
4. With the help of flow chart explain N-R method of load flow analysis

5. Refer question 5 of module 2 and solve by Newton Raphson Method.
6. Derive the expressions for diagonal elements of Jacobian matrices in NR method of load flow analysis.
7. Describe fast decoupled load flow method with a flow chart.
8. Compare different method of load flow solution procedure in respect of the following.
   i) Time per iteration
   ii) Total solution time
   iii) Acceleration of convergence of iterative solution
   iv) Adaptability for power system calculations

Module -4

1. Explain with reference to economic operation of electric power system, the equal incremental cost criterion. Comment on the same, if the filtration way to include the effect of transmission line losses also.
2. What are transmission line loss coefficients? Obtain the general expression B_{mn} with usual notations.
3. Explain in brief penalty factors & loss co-efficient. Derive the relevant expression.
4. For the system shown in figure, obtain the loss co-efficient. Assume I_1 & I_2 are in phase.



5. Explain problem formulation, solution procedure & algorithm for hydrothermal coordination.
6. Explain the modes of failures of a system.
7. Explain the generating system and its performance,.
8. Define system security and explain major functions involved in the system security.
9. Explain the importance of security assessment in the power system. What are the constraints and how these constraints differ from the normal operating constraints?
10. Distinguish between the normal operating constraints and security constraints of a power system.
11. What are the factors which affect the power system security?

Module-5

1. Derive the swing equation in the form d2 / dt2 = Πf / H (Pm-Pe)
2. Explain the simplified representation of synchronous machine for transient stability studies. Why its detailed representation of synchronous machine is also necessary for stability studies?
3. Explain clearly the representation of load for transient stability studies.
4. Explain how the network performs equation used for load flow analysis can be applied to describe the performance of the network during a transient period.
5. Starting from the pair of equations representing a swing equation, explain the modified Eulers method of obtaining swing curie.
6. With the help of flow diagram, explain the method of finding the transient stability of a given power system based on Runga-Kutta method.
7. Explain step by step method for the numerical analysis of swing equation.
8. Explain Milne's predictor-corrector method for transient stability studies.
9. Explain the Z BUS building algorithm.
10. Explain the steps involved in solving power system stability solution of swing equation using point by point method

Question bank for Lab content.

1. What is importance of Ybus?
2. What is reactance diagram?
3. Define Per Unit.
4. What are symmetrical components?
5. How symmetrical components are useful in solution of Power System?
6. What are unsymmetrical faults?
7. Define Stability.
8. What is singular transformation?
9. What is load flow study?
10. What are the different methods of LFS?
11. Compare different methods of LFS?
12. What is the importance of Jaccobian matrix?
13. What is bus building algorithm?
14. Give formulas for different modifications in building algorithm?
15. What are A, B, C, D parameters?
16. How transmission lines are classified &represented?
17. What is voltage regulation?
18. What is maximum& minimum voltage regulation?
19. What is power angle diagram?
20. What are salient & non salient pole machines?
21. What is reluctance power?
22. What is the effect of saliency &saturation?
23. What is swing equation?
24. What is the importance of swing curve?
25. What is critical clearing angle &time?
26. How to determine critical clearing time graphically?
27. Classify faults in the power system?
28. What are sequence impedances &sequence networks?
29. Explain different types of buses in the power system
30. What is single line diagram?
31. What are the conditions to draw single line diagram?
32. How sequence networks are connected in case of different faults?
33. What is economic operation of power system?
34. What are the conditions for economic dispatch with &without loss?
35. What are the guidelines to select initial value of lambda?
36. What is spinning reserve?
37. Give guidelines to select spinning reserve?
38. What are the constraints in unit commitment &economic dispatch?
39. What is the difference between steady state & transient stability?
40. Stability limits have single or multiple values?
41. What are the methods to improve steady state & transient stability?
42. Explain equal area criterion?
43. How stability is improved using equal area criterion?
44. What is the advantage of MATLAB & simulation?

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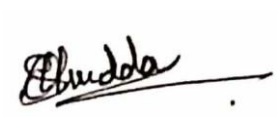
			
Prof. S. G. Huddar	**Prof. H. R. Zinage**	**HOD**	**Principal**

Course	**SIGNAL & DIGITAL SIGNAL PROCESSING**		
Course Code	**21EE63**	**CIE Marks**	50
No of Lecture Hrs /week(L:T:P:S)	2:2:0:0	**SEE Marks**	50
Total Number of Lecture Hrs	40	**Exam Hours**	03
		CREDITS – 03	

FACULTY DETAILS:		
Name: Prof. A. U. Neshti	**Designation:** Asst. Professor	**Experience:** 15 years
No. of times course taught:04	**Specialization:** Digital Electronics	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Electrical and Electronics Engineering	V	Linear IC's and applications

2.0 Course Objectives

1. To explain basic signals, their classification, basic operations on signals, and the properties of the systems.
2. To explain the convolution of signals in continuous and discrete time domain and the properties of impulse response representation.
3. To explain the computation of Discrete Fourier Transform of a sequence by direct method, Linear transformation Method and using Fast Fourier Transformation Algorithms.
4. To explain design of IIR all pole analog filters and transform them into digital filter using Impulse Invariant and Bilinear transformation Techniques and to obtain their Realization.
5. To explain design of FIR filters using Window Method and Frequency Sampling Method and to obtain their Realization.

3.0 Course Outcomes

The student, after successful completion of the course, will be able to:

	Course Outcome	Cognitive Level	
C314.1	Discuss classification and basic operations that can be performed on both continuous and discrete time signals	L1-L4	PO1,PO2,PO3, PO8,PO9,PO12
C314.2	Evaluate Discrete Fourier Transform of a sequence and the convolution of two sequences to determine the output sequence.	L1-L4	PO1,PO2,PO3, PO8,PO9,PO12
C314.3	Evaluate Discrete Fourier Transform of a sequence by using fast methods.	L1-L4	PO1,PO2,PO3, PO8,PO9,PO12
C314.4	Design Butterworth and Chebyshev IIR digital filters and FIR filters using different techniques.	L1-L4	PO1,PO2,PO3, PO8,PO9,PO12
C314.5	Develop different structures for IIR and FIR filters.	L1-L4	PO1,PO2,PO3, PO8,PO9,PO12
Total Hours of instruction		**50**	

4.0 Course Content

Module-1

Introduction: Definitions of a Signal and a System, Classification of Signals, Basic Operations on Signals, Basic Elementary Signals, properties of systems.

Time-domain representations for LTI systems: Convolution, impulse response representation, Convolution Sum and Convolution Integral. Properties of impulse response representation.

Module-2

Discrete Fourier Transforms (DFT):

Introduction to DFT, Properties of DFT, multiplication of two DFTs- the circular convolution, additional DFTproperties, use of DFT in linear filtering, overlap-save and overlap-add method.

Module-3

Fast-Fourier-Transform (FFT) algorithms: Direct computation of DFT, need for efficient computation of the DFT (FFT algorithms). Radix-2 FFT algorithm for the computation of DFT and IDFT–decimation-in-time andDecimation-in-frequency algorithms.

Module-4

IIR filter design: Characteristics of commonly used analog filters – Butterworth and Chebyshev Type - I filters, analog to analog frequency transformations. Design of Digital IIR filters from analog filters (Butterworth and Chebyshev) - impulse invariance method. Mapping of transfer functions: Bilinear transformation method. Implementation of discrete-time systems.

Module-5

FIR filter design: Introduction to FIR filters, design of FIR filters using - Rectangular, Hamming, Hanning andKaiser windows, FIR filter design using frequency sampling Technique. Implementation of discrete-time systems: Structures for Filters: IIR Filters - direct form I and direct form II, cascade and parallel structures. FIRfilters-direct form, cascade and Linear Phase Form.

5.0 Relevance to future subjects

Sl.no	Semester	Subject	Topics
01	VIII	Project work	Automation

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Digital photo cameras, MP3 players to automobiles.
02	Speech processing, image processing
03	Applications of audio processing

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	NPTEL	Topic: DSP Processors

8.0 Books Used and Recommended to Students

Text Books
1. Introduction to Digital Signal Processing, Jhonny R. Jhonson, Pearson, 1st Edition, 2016. **2.** Simon Haykins and Barry Van Veen, "Signals and Systems", 2nd Edition, 2008, Wiley India. ISBN 9971-51-239-4.
Reference Books
1.Digital Signal Processing – Principles, Algorithms, and Applications, Jhon G. Proakis, Dimitris G. ManolakisPearson 4th Edition, 2007. 2.Digital Signal Processing A.NagoorKani McGraw Hill, 2nd Edition, 2012. 3.Digital Signal Processing, Shaila D. Apte, Wiley ,2nd Edition, 2009, 4.Digital Signal Processing, Ashok Amberdar, Cengage, 1stEdition, 2007 5.Digital Signal Processing Tarun Kumar Rawat Oxford 1st Edition, 2015 6. Signals and Systems, NagoorKani , McGraw Hill, 1st Edition 2010 7. Signals and Systems, A Primer with MATLAB Matthew N.O. Sadiku Warsame H.Ali CRC Press 1st Edition 8.Signals and Systems, Anand Kumar, PHI, 3rd Edition, 2015.
Additional Study material & e-Books
1) P.Ramesh Babu"Digital Signal Processing", Sitech publication 2003 2) "Digital Signal Processing" A Simplified approach by Dr. D Ganesh Rao & V P Gejji

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/VideosRecommended

Website and Internet Contents References
1) https://www.tutorialspoint.com/digital_signal_processing/index.html 2) www.bores.com/courses/intro/basics/1_whatis.html

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	Website
1	Elsvier Journal	https://www.journals.elsevier.com/digital-signal-processing/
2	ICGST Journal of Digital signal processing	http://www.icgst.com/journals/journal.aspx?subid=45
3	International Journal of Advancements in Digital SignalProcessing	http://journals.theired.org/ijdsp.html
4	Science Direct	http://www.sciencedirect.com/science/journal/10512004

11.0 Examination Note

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and willbe **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methodsof the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per theoutcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers forthe subject (**duration 03 hours)**

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximumof 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module.

12.0 Course Delivery Plan

Module No.	Lecture No.	Content of Lecture	% of Portion
1	1.	Definitions of a signal and a system	20
	2.	Classification of signals	
	3.	Basic Operations on signals	
	4.	Elementary signals-	
	5.	Properties of system	
	6.	Introduction and convolution sum	
	7.	Convolution sum and convolution integral	
	8.	Properties of Impulse response I	
2	9.	Introduction, Definitions	20
	10.	Properties of DFT	
	11.	circular convolution – periodic convolution	
	12.	Use of tabular arrays, circular arrays	
	13.	Stock ham's methods- Examples	
	14.	linear convolution – two finite duration sequence	
	15.	overlap add methods with examples	
	16.	overlap save methods with examples	
3	17.	Introduction to Fast Fourier Transform algorithms	20
	18.	Decimation in time algorithm with examples	
	19.	Examples	
	20.	first decomposition, number of computations	
	21.	continuation of decomposition, number of multiplications	
	22.	computational efficiency with examples	
	23.	decimation in frequency algorithms with example	
	24.	Inverse radix-2 algorithm.	
4	25.	Characteristics of commonly used analog filters – Butterworth	20
	26.	Characteristics of commonly used analog filters Chebyshev Type - I filters.	
	27.	Analog to analog frequency transformations.	
	28.	Design of Digital IIR filters from analog filters (Butterworth impulse invariance method)	
	29.	Design of Digital IIR filters from analog filters (Chebyshev impulse invariance method)	
	30.	Design of Digital IIR filters from analog filters (Butterworth bilinear transformation)	
	31.	Design of Digital IIR filters from analog filters (Chebyshev bilinear transformation)	

	32.	Digital to digital frequency transformations.	
5	33.	Introduction to FIR filters, design of FIR filters using – Rectangular.	20
	34.	Design of FIR filters using – Hamming,	
	35.	Design of FIR filters using – Hanning	
	36.	Design of FIR filters using –Kaiser	
	37.	FIR filter design using frequency sampling Technique.	
	38.	Implementation of discrete-time systems: Structures for Filters: IIR Filters - direct form I and direct form II,	
	39.	cascade and parallel structures	
	40.	FIRfilters-direct form, cascade and Linear Phase Form	

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl. No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on Time-domain representations for LTI systems ,Discrete fourier trasform	Students Understand Time-domain representations for LTI systems and find Discrete fourier trasform	Module 1,2 of the syllabus	4	Individual Activity.	Book 1, 2 of the text book
2	Assignment 2: University Questions on DIF and DIT-FFT algorithms , IIR filter design & FIR filter design	Students study the importance of DIF and DIT-FFT algorithms , IIR filter design & FIR filter design	Module 3,4,& 5 of the syllabus	9	Individual Activity.	Book 1, 2 of the text book
3	Quiz: Time-domain representations for LTI systems ,Discrete fourier transform, DIF and DIT-FFTalgorithms , IIR filter design & FIR filter design	Students study the Time-domain representations for LTI systems ,Discrete fourier transform, DIF and DIT-FFTalgorithms , IIR filter design & FIR filter design	All Modules of the syllabus	13	Individual Activity.	Book 1, 2 of the text book.

14.0 QUESTION BANK

Module 1: Introduction & Time-domain representations for LTI systems

1. Define a signal and a system. Explain any five properties of a LTI system.
2. For each of the systems state whether system is linear, shift invariant, stable, causal, and invertible.
   i) $y(n) = \log x(n)$
   ii) $y(n) = x(n^3)$
3. Check whether the fallowing signals are periodic or not. If periodic, determine their fundamental period.
   i) $x(n) = \cos(\prod n/7)\ \sin(\prod n/3)$
   ii) $x(t) = (2\cos^2(\prod t/2)-1)\ \sin(\prod t).\ \cos(\prod t)$
4. A rectangular pulse $x(t) = A \quad 0 \le t \le T$
   $= 0 \quad$ elsewhere
   is applied in an integrator circuit. Find total energy of the output y(t) of the integrator.
5. Sketch the fallowing signals and determine their even and odd components and i)
   r(t+2)-r(t+1)-r(t-2)+r(t-3) ii) u(n+2)-3u(n-1)+2u(n-5)
6. Find the periodicity the signal $x[n] = \cos[2\prod n/5] + \cos[2\prod n/7]$
7. The impulse response of a LTI system is given by h[n] = {1,2,1,-1}, Determine the response of the system for the input and x[n] = {1,2,3,1} and sketch the output.
8. Find the convolution of two finite duration sequences
   $h[n]=a^n\ u[n]$ for all n

$x[n] = b^n u[n]$ for all n i)a=b ii)a≠b.

9. Find the step response of a system whose impulse response is given by h(t) =u(t+1)-u(t-1)
10. Determine y[n] if x[n]=n+2 for $0 \le n \le 3$ and $h[n] = a^n u[n]$ for all n
11. What do you mean by impulse response of an LTI system? How can the above be interpreted? Starting fromfundamentals deduce the equation for the response of an LTI system if the input sequence x(n) and the impulse response are given.
12. Determine the response of LTI system whose input and unit sample response is given as
    x(n)= n+1 for $0 < n < 2$
    0 else
    $h(n)= a^n u(n)$ for all n.

Module 2: Discrete Fourier Transforms

1) State and prove time shifting property of DFT.
2) Explain how the DFT can be used to compute N equispaced samples of the Z-transform of an N-point Sequence, on a circle of radius r.
3) Using Overlap-save method compute y (n) of a FIR filter with impulse response h (n) = {3, 2, 1} and input x(n)={2,1,-1,-2,-3,5,6,-1,2,0,2,1}.Use only 8 point circular convolution in your approach.
4) Compute circular convolution of two given sequences $x_1(n)=(2,1,2,1)$,$x_2(n)=(1,2,3,4)$using DFT and IDFT method.
5) For the given sequence $x_1(n) = \{1,2,3,1\}$,$x_2(n) = \{4,3,2,2\}$. Find $x_3(n)$ = such that $X3(k) = X_1(k).X_2(k)$.
6) Find $x_3(n)$ using DFT and IDFT method for the given $x_1(n) = \{1,1,2,1\}$, $x_2(n) = \{1,2,3,4\}$
7) Consider sequence $x_1(n) = \{0,1,2,3,4\}$,$x_2(n) = \{0,1,0,0,0\}$.Determine a sequence y(n) so that $Y(k) = X_1(k) . X_2(k)$
8) Find the 4 point circular convolution of the sequence $x_1(n) = \{1,2,3,1\}$,$x_2(n) = \{4,3,2,2\}$ using the time domain approach and verify the result using frequency domain approach**.**
9) Compute the 4 point DFT of the sequence x(n) = {1,0,1,0}.Also find y(n) if $Y(k) = X((k-2))_4$
10) Consider the sequence x1(n)= {0,1,2,3,4},x2(n) ={0,1,0,0,0},s(n)={1,0,0,0,0} and their point DFT's
    i) Determine a sequence y(n) so that y(k)=x1(k).x2(k)
    ii) Is there a sequence x3(n) such that s(k)=x1(k).x2(k)?
11) A long sequence x(n) is filtered though a filter the impulse response h(n) to yield the output y(n),if x(n) ={1,1,1,1,1,3,1,1,4,2,1,1,3,1},h(n)={1,-1}.Compute y(n) using overlap save techniques.
12) Compare linear convolution and circular convolution.
13) Compute the linear convolution of the sequences x1(n)={1,2,3,1} and x2(n)= {4,3,2,2} using circular convolution.
14) Define DFT. Derive the relationship of FT to i) the DTFT ii) the z transform.
    A long sequence x(n) is filtered through a filter with impulse response h(n) to yield the output y(n). Ifh(n)=(1,2), x(n) =(1,4,3,0,7,4,-7,-7,-1,3,4,3), compute y(n), using the Overlap-add method. Use onlya 5- point circular convolution.
15) Find DFT of a sequence x(n) = (1,1,0,0) and also find IDFT of Y(k) = (1,0,1,0).
16) State and Prove the Periodicity and Linearity property of DFT.
17) The two sequences $x_1(n)$ and $x_2(n)$ are given as follows $x_1(n)$ =(2,1,2,1) and $x_2(n)$ = (1,2,3,4). Find out sequence $x_3(n)$ which is equal to circular convolution of above two sequences $x_3(n) = x_1(n) O x_2(n)$. and verify the result using matrix multiplication method.
18) State and Prove Parseval's Theorem.
19) If x(n) = X(k) then show that $DFT[x((-n))_N] = X((-k))_N$
20) For the given sequence $x_1(n) = \{1,2,3,1\}$,$x_2(n) = \{4,3,2,2\}$. Find $x_3(n)$ = such that $X_3(k)= X_1(k).X_2(k)$
21) Compute the 4 point DFT of the sequence x(n) = {1,0,1,0}.Also find y(n) if $Y(k) = X((k-2))_4$
22) Find the 4 point circular convolution of the sequence $x_1(n) = \{1,2,3,1\}$,$x_2(n) = \{4,3,2,2\}$ using the time domain approach and verify the result using frequency domain approach.
23) Compute IDFT of the sequence X(k) = (2,1+j,0,1-j)
24) For the given sequence $x_1(n) = \{1,1,1,1\}$,$x_2(n) = \{2,2,2,2\}$. Find $x_3(n)$ = such that $X_3(k) = X_1(k).X_2(k)$.

Module 3: Fast Fourier transform algorithm

1) What are the properties of phase factor (W_N) that are exploited in fast fourier transform algorithms?
2) Develop decimation in time (DIT) FFT algorithm with all necessary steps and neat signal flowdiagram for N-point DFT.

3) What is FFT? Explain Radix-2 DIT-FFT algorithm.
4) Develop DIF-FFT algorithm with all necessary steps and neat signal flow diagram used in computing N- point DFT, X(k) of a N-point sequence x(n).Using the same. Compute the DFTsequence x(n)={1,1,1,1,1,1,1,1}.
5) Derive Radix-2 DIF FFT algorithm to compute DFT of a N=8 point sequence and drawthe complete signal flow graph.
6) Find the sequence x(n) corresponding to the 8 point DFT X(k)={4,1-j2.414,0,1-j0.414,0,1+j0.414,01+j2.414} by using any of the Radix-2 FFT algorithms to compute IDFT.
7) Determine 4 point IDFT of X(k)={2.5,-0.25+j0.75,0,-0.25-j0.75} using DIFFFT algorithm.
8) How many complex multiplications are required for direct computation of 64 point DFT?What is its value if FFT is used?
9) Determine 8 point DFT of x(n) = {1,0,-1,2,1,1,0,2} using radix-2 DIT-FFT algorithm. Show clearlyall the Intermediate results.
10) Why FFT is needed? What is the speed improvement factor in calculating 64 point DFT of asequence using direct computation and FFT algorithm.
11) What are the differences and similarities between DIT and DIF FFT algorithm?
12) Develop DIT FFT algorithm for decomposing the DFT for N=6 and draw the flow diagrams forN= 2x3.
13) If x1(n) =[1,2,0,1] and x2(n) = [1,3,3,1], Obtain x1(n)©x2(n) using DIT-FFT algorithm.
14) Find the 4 point DFT of the following sequences, using a single 4 point DFTx1(n) =[1,2,0,1] and x2(n)= [2,2,1,1].
15) Compute number of complex multiplications for the direct evaluation of DFT v/s FFT algorithm for N=4,16,64,256 also find the speed improvement factor.
16) Find the 8 point DFT of the given sequence x(n). X(n)=(0,1,2,3,4,5,6,7)
17) Compute 8 point DFT of the sequence x(n)=(11111111) using DIT, DIF algorithm.
18) Compute IDFT of the sequence X(k)={4,1-j2.414,0,1-j0.414,0,1+j0.414,0,1+j2.414}
19) Determine 8 point DFT of x(n) = {1,0,-1,2,1,1,0,2} using radix-2 DIT-FFT algorithm.Show clearly all the intermediate results.
20) Find the DFT of a sequence x(n)={1,2,3,4,4,3,2,1} using DIT algorithm.
21) Compute 4-point DFT of a sequence x(n)={0,1,2,3} using DIT algorithm.
22) Develop DIT-FFT algorithm for N=9=3x3 and draw the complete signal flow graph. A 9 point realvalued sequence is given by x(n)={0,1/4,1/2,3/4,1,3/4,1/2,1/4,0}
23) Find the DFT of a sequence x(n)={1,1,1,1,1,1,1,1} using DIT algorithm.

Module 4: Design of IIR Digital filters

1) Transform the analog filter H(s) = (s+3)/(S+1)(s+2) to a digital filter using the matched z transform. LetT=0.5 sec.
2) Using the bilinear transformation S= $(1- z^{-1})/ (1+z^{-1})$ .What is the image of $S=e^{j\Omega/2}$in the Z-plane.
3) Determine the order of Butterworth and Chebyshev approximation analog filters used to meet thefollowing specification: passband attenuation of 1dB at 4kHz and stop band attenuation of 40B at6 kHz.
4) Design a chebyshev type I analog filter to meet the following specification: pass band attenuation2 dB at 4 rad/sec and stop band attenuation of 10 dB at 7 rad/sec.
5) Write a short note on bilinear transformation.
6) Compare FIR versus IIR filters.
7) Design a analog filter which has equiripple characteristics in passband minitoni8c falloff characteristics in stop band given maximum passband attenuation of 2.5dB at Ωp= 20 rad/sec and the stop band attenuation of 30 dB at Ωs =30 rad/sec. Transform the analog filter to digital filter using impulse invariance method.
8) Transform the analog filter $H(s) = (s+0.1)^2/(s+0.1)^2+9$ to H(Z) using the impulse invariance transformation.
9) For the given specification α_p=1 dB, α_s=30 dB, Ωp=200 rad/sec, Ωs=600 rad/sec. Determine the order of low pass Butterworth filter.

1) Compare Digital filter with Analog filter. Also explain the advantages and disadvantages of digital filter.
2) For the given specifications α_p= 3dB, α_s= 16 dB, fp=1 kHz and fs=2kHz. Determine the order of filter using Chebyshev type-I approximation. Also Find H(s).

10) For the analog transfer function H(s)=(2)/((s+1)(s+2)). Determine H(z) using impulse invariance method. Assume T=1 sec.
11) Using Bilinear transformation, design a high pass filter, monotonic in passband with cutoff

frequency of 1000 Hz at α_P=3 dB and down to 10 dB at 350 Hz. The sampling frequency is 5000 Hz.

12) Determine direct form II realization for the following system y(n)=-0.1y(n-1)+0.72y(n-2)+0.7x(n)-0.252x(n-2).

13) Realize the system with difference equation y(n)=3/4y(n-1)-1/8y(n-2)+x(n)+ 1/3x(n-1) in cascade form.

14) Obtain the direct form I, direct form II, cascade and parallel form realization for the following system y(n)= -0.1y(n-1)+0.2 y(n-2)+3x(n)+3.6x(n-1)+0.6x(n-2).

15) Draw the direct form II, cascade and parallel form structure for the following system
$H(z)= (1-3/4z^{-1}+1/8z^{-1})/(1+z^{-1}+2/9z^{-2})(1+1/4z^{-1})$

16) Obtain a parallel realization for the following
$H(z)= (8z^{3}-4z^{-2}+11z-2)/(z-1/4)(z^{-2}-z+1/2)$

Module 5: Design of FIR Digital filters

1) Show that if the impulse response has the even symmetry then FIR filter possesses linear phase Characteristics. Comment on position of zero on the Z-plane

2) Explain the frequency sampling method of designing FIR filters and draw the corresponding block diagram

3) Explain the structures used for realizing FIR filters by illustrations.

4) Show that the roots of H(z) occur in reciprocal pair for a linear phase FIR filter.

5) Consider a FIR filter with system function:
$H(z) = 1+2.82\ z^{-1}+3.4048\ z^{-2}+1.74\ z^{-3.}$ Sketch the direct form and lattice realization of the filter.

6) Write a short note on window-based Fir filter design.

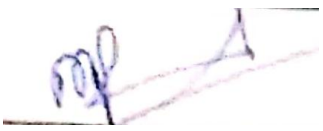
7) Write short notes on Butterfly operation and in place computation.

8) What are advantages and disadvantages ith design of FIR filters using window function?

9) The frequency response of a linear phase Fir filter is given by
$H(e^{jw}) = e^{j3w}[2+1.8\ co\ 3w+1.2\ cos2w+0.5cosw]$.Find the impulse response sequence of the filter.

10) What condition on the Fir sequence h(n) are to be imposed in order that the filter can be called a linear phase filter.

11) Discuss design method of FIR filters

Prepared by	Checked by		
			
Prof. A. U. Neshti	**Prof. M. P. Yenagimath**	**HOD**	**Principal**

Subject Title	ELECTRICAL ENGINEERING MATERIALS		
Subject Code	21EE644	**CIE Marks**	50
Number of Lecture Hrs / Week	03	**SEE Marks**	50
Total Number of Lecture Hrs	40	**Exam Hours**	03
			CREDITS – 03

FACULTY DETAILS:		
Name: Prof. P I Savadatti	**Designation:** Asst. Professor	**Experience:** 09 Years
No. of times course taught: 01	**Specialization:** Digital Electronics	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Electrical &Electronics Engineering	I/II	Basic Electrical Engineering
02	Electrical &Electronics Engineering	I/II	Basic Electronics Engineering
03	Electrical &Electronics Engineering	III	Machines, Transformers and Generators
04	Electrical &Electronics Engineering	IV	Transmission and Distribution

2.0 Course Objectives

- To impart the knowledge of conducting, dielectric, insulating and magnetic materials and their applications.
- To impart the knowledge of superconducting materials and their applications.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to:

	Course Outcome	RBT Level	POs
C318.1	Discuss electrical and electronics materials, their importance, classification and operational requirement	L1, L2	1,2,6,7,8,12
C318.2	Discuss conducting, dielectric, insulating and magnetic materials used in engineering, their properties and classification.	L1, L2	1,2,6,7,8,12
C318.3	Explain the phenomenon superconductivity, super conducting materials and their application in engineering	L1, L2	1,2,6,7,8,12
C318.4	Explain the superconductive materials and its applications	L1, L2	1,2,6,7,8,12
C318.5	Explain the plastic and mention their properties and applications and also discuss materials used for Opto electronic devices.	L1, L2	1,2,6,7,8,12
Total Hours of instruction		**40**	

4.0 Course Content

MODULE 1

Introduction to Electrical and Electronic Materials: Importance of materials, Classification of electrical and electronic materials, Scope of electrical and electronic materials, Requirement of Engineering materials, Operational requirements of electrical and electronic materials, Classification of solids on the basis of energy gap, Products – working principle and materials, Types of engineering materials, Levels of material structure. Spintronics and Spintronic materials, Ferromagnetic semiconductors, Left handed materials.

Conductors: Conductor materials, Factors affecting conductivity, Thermal conductivity, Heating effect of current, Thermoelectric effect, Seebeck effect, Thomson effect, Wiedemann – Franz law and Lorentz relation, Problems. 08**Hours**

Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding.

MODULE2

Conductive Materials and Applications: Mechanically processed forms of electrical materials, Types of conducting materials, Low resistivity materials, High resistivity materials, Contact materials, Fusible materials, Filament materials, Carbon as filamentary and brush material, Material for conductors, cables, wires, solder, sheathing and sealing.

Dielectrics: Introduction to dielectric materials, classification of dielectric materials, Dielectric constant, Dielectric strength and Dielectric loss. Polarization, Mechanisms of polarization, Comparison of different polarization process, Factors affecting polarization, Spontaneous polarization, Behaviour of polarization under impulse and frequency switching, Decay and build-up of polarization under ac field, Complex dielectric constant. 08**Hours**

Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding.

MODULE 3

Insulating Materials: Insulating materials and applications – Ceramic, Mica, Porcelain, Glass, Micanite and Glass bonded mica. Polymeric materials – Bakelite, Polyethylene. Natural and synthetic rubber. Paper. Choice of solid insulating material for different applications, Liquid insulating materials – Requirements, Transformer oil, Bubble theory, Aging of mineral insulating oils. Gaseous insulating Materials – Air, Nitrogen, Vacuum.

Magnetic Materials: Origin of permanent magnetic dipole, Magnetic terminology, Relation between relative permeability and magnetic susceptibility. Classification of magnetic materials, Diamagnetic, Paramagnetism, Ferromagnetism, Antiferromagnetism and the corresponding materials. Ferrimagnetism and ferrites – properties and applications, Soft and hard ferrites. Curie temperature, Laws of magnetic materials. Magnetization curve, Initial and maximum permeability. Hysteresis loop and loss, Eddy current loss. 08 **Hours**

Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding.

MODULE4

Magnetic Materials (continued): Types of magnetic materials, Soft and hard magnetic materials, High energy magnetic materials, Commercial grade soft and hard magnetic materials.

Superconductive Materials: Concept of superconductors, Meaning of phenomenon of superconductivity, Properties of superconductors, Types of superconductors, Critical magnetic field Superconductive Materials (continued):and critical temperature, Effects of Isotopic mass on critical temperature, Silsbee rule, Depth of penetration and coherence length. Ideal and Hard superconductors, Mechanism of super conduction, London's theory for Type I superconductors, GLAG theory for Type I superconductors, BCS theory, Applications and limitations. Applications of high temperature superconductors, Superconducting solenoids and magnets, MRI for medical diagnostics. 08 **Hours**

Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding.

MODULE 5

Plastics: Introduction, Thermoplastics, Rubbers, Thermosets, DC and AC properties, Mechanical properties and processing of plastic.

Materials for Opto–Electronic Devices: Introduction, Optical phenomena, Reflection, Refraction, Transmittivity, Scattering, Optical absorption, Optical properties of non-metals, Optical properties of metals, Optical properties of semiconductors, Optical properties of insulators. Luminescence, Opto – Electronic devices, Photoconductivity, Photoconductive cell. 08 **Hours**

Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	VI	Mini-project	
02	VII	Power System Analysis – 2, Power System Protection, Industrial Drives and Application, Sensors and Transducers	Machine, Equipment, components or devices etc
03	VIII	Power System Operation and Control, FACTs and HVDC Transmission, Electric Vehicles Technologies, Electrical Power Quality	Machine, Equipment, components or devices etc

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Electrical Transmission and Distribution.
02	Selection of Consumer Items such as Bulb filament, Heaters, Iron press etc

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Material used for Electrical Contacts, Resistors, Relays, Switches etc
02	NPTEL	

8.0 Books Used and Recommended to Students

Text/Reference Books				
1	Advanced Electrical and Electronics Materials; Processes and Applications.	K.M. Gupta Nishu Gupta	Wiley	First Edition, 2015
2	Electronic Engineering Materials	R.K. Shukla Archana Singh	McGraw Hill	2012
3	Electrical Properties of Materials	L Solymar et al	Oxford	9th Edition, 2014
4	Electrical Properties of Materials	A.J. Dekker	Pearson	2016
5	Principle of Electronic Materials and Devices	S.O. Kasap	McGraw Hill	3rd Edition 2010

9.0 Relevant Websites (Reputed Universities and Others) for Notes /Animation / Videos Recommended

Website and Internet Contents References
1. NPTEL Videos 2. www.wikipedia.com

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	Electronics for you	https://electronicsforu.com/
2	Newelectronics	http://www.newelectronics.co.uk/digital-magazine/

11.0 Examination Note

Assessment Details (both CIE and SEE) :
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:
Three Unit Tests each of 20 Marks (duration 01 hour)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester.
Two assignments each of 10 Marks
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester.
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)
6. At the end of the 13th week of the semester
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:
Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours). The question paper will have ten questions. Each question is set for 20 marks.
There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
The students have to answer 5 full questions, selecting one full question from each module.

12.0 Course Delivery Plan

Module No.	Lect. No.	Content of Lecture	% of Portion
I	1.	Importance of materials, Classification of electrical and electronic materials.	20
	2.	Scope of electrical and electronic materials.	
	3.	Requirement of Engineering materials, Operational requirements of electrical and electronic materials.	
	4.	Classification of solids on the basis of energy gap, Products – working principle and materials.	
	5.	Types of engineering materials.	
	6.	Levels of material structure. Spintronics and Spintronic materials.	
	7.	Ferromagnetic semiconductors, Left handed materials.	
	8.	Conductors: Conductor materials, Factors affecting conductivity, Thermal conductivity, Heating effect of current, Thermoelectric effect, Seebeck effect, Thomson effect, Wiedemann – Franz law and Lorentz relation, Problems.	
	9.	Insulating Materials: Insulating materials and applications – Ceramic, Mica	
	10.	Porcelain, Glass, Micanite and Glass bonded mica	
	11.	Polymeric materials – Bakelite & Polyethylene, Natural and synthetic rubber, Paper	

II	12.	Choice of solid insulating material for different applications	20
	13.	Liquid insulating materials its requirements	
	14.	Transformer oil & Bubble theory, Aging of mineral insulating oils.	
	15.	Gaseous insulating Materials – Air, Nitrogen, Vacuum.	
	16.	Magnetic Materials: Origin of permanent magnetic dipole	
III	17.	Magnetic terminology, Relation between relative permeability and magnetic susceptibility.	20
	18.	Classification of magnetic materials, Diamagnetic,	
	19.	Paramagnetism & Ferromagnetism,	
	20.	Antiferromagnetism and the corresponding materials.	
	21.	Ferrimagnetism and ferrites	
	22.	Properties and applications, Soft and hard ferrites	
	23.	Curie temperature, Laws of magnetic materials.	
	24.	Magnetization curve, Initial and maximum permeability, Hysteresis loop and loss,	
IV	25.	Magnetic Materials (continued):Types of magnetic materials, Soft and hard magnetic materials.	
	26.	High energy magnetic materials & Ideal and Hard superconductors	
	27.	Commercial grade soft and hard magnetic materials.	
	28.	Superconductive Materials: Concept of superconductors, Meaning of phenomenon of superconductivity.	
	29.	Properties of superconductors & Types of superconductors	
	30.	Critical magnetic field and critical temperature	
	31.	Effects of Isotopic mass on critical temperature, Silsbee rule, Depth of penetration and coherence length.	
	32.	Mechanism of super conduction, London's theory for Type I superconductors, GLAG theory for Type I superconductors, BCS theory, Applications and limitations	
V	33.	Introduction, Thermoplastics,	20
	34.	Thermosets, DC and AC properties	
	35.	Rubbers Mechanical properties, Processing of plastic	
	36.	Materials for Opto – Electronic Devices: Introduction, Optical phenomena	
	37.	Reflection, Refraction, Transmittivity, Scattering, Optical absorption	
	38.	Optical properties of non-metals, Optical properties of metals	
	39.	Optical properties of insulators. Luminescence, Optical properties of semiconductors	
	40.	Opto –Electronic devices, Photoconductivity, Photoconductive cell.	

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl. No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment-1 Questions on importance of materials, Scope of electrical and electronics materials	Student will be able to understand the importance and scope of Electrical and Electronics materials.	Module-1	4	Individual	1,2

2	Assignment-2: Questions on understand the behavior of conductor and its properties.	Student will be able to understand the conductivity of materials.	Module-2	9	Individual	1,2
3	Technical Quiz		Module4	13	Individual	1,2

14.0 QUESTION BANK

MODULE-I

1. List the characteristics of good materials.
2. Explain the effect of temperature on electrical conductivity of metals.
3. Mention the desired properties and uses of low resistivity and high resistivity materials.
4. Explain different materials that can be used for lamp filaments.
5. Explain briefly the uses of following in electrical industry.
   A) Silver
   B) Aluminum
   C) Copper
6. Explain the different types of engineering materials.
7. Classify electrical and electronics engineering materials.
8. Discuss the Levels of material structure.
9. Short note on Spintronics and Spintronic materials.
10. Explain the factors affecting conductivity.
11. Discuss the concept of thermoelectric effect.

MODULE-II

1. Explain the effect of temperature on electrical conductivity of metals.\
2. What are the general properties of the conducting materials.
3. Explain the different types of semiconductors.
4. Obtain the expression for the conductivity of an intrinsic semiconductor.
5. Write a note on dielectric loss.
6. Explain the factors affecting polarization.
7. Explain briefly spontaneous polarization.
8. Write a short note on dielectric strength and dielectric constant.

MODULE-III

1. List the characteristics of good insulating materials.
2. What is polarization? What are the types.
3. What are the properties & applications of Mica and glass.
4. Bring out the differences between hard & soft magnetic materials.
5. Bring out the differences between hard & soft magnetic materials.
6. What is magnetostriction? Explain in brief.
7. Explain Polymeric materials - Bakelite & Polyethylene.

MODULE-IV

1. Explain the Effects of Isotopic mass on critical temperature.
2. Write short note on MRI for medical diagnostics.
3. Define spin-spin coupling.
4. Explain briefly about atomic absorption spectroscopy.
5. What is electron spin resonance? Mention its applications.

6. What is Superconductive? And explain concept of superconductors.
7. What is Critical magnetic field and critical temperature.

MODULE-V

1. What are plastics? List the classification of plastics.
2. Distinguish between the thermosetting and thermoplastics.
3. List the Optical properties of insulators.
4. List the Optical properties of non-metals.
5. What are the types of rubber and mention the applications of each type.
6. Short note on Opto –Electronic devices, Photoconductivity.

Prepared by	Checked by		
			
Prof. P I Savadatti	**Prof. A. U. Neshti**	**HOD**	**Principal**

Subject Title	PROJECT MANAGEMENT		
Subject Code	21ME651	**IA Marks**	50
Number of Lecture Hrs / Week	03	**SEE**	50
Total Number of Lecture Hrs	40	**Exam Hours**	03
		CREDITS – 03	

FACULTY DETAILS:		
Name: Girish Zulapi	**Designation:** Asst. Professor	**Experience:**15
No. of times course taught:00	**Specialization:** Product Design and Manufacturing	

FACULTY DETAILS:		
Name: Nagaraj T. Kambar	**Designation:** Asst. Professor	**Experience:**05
No. of times course taught:00	**Specialization:** Thermal Engineering	

1.0 Course Objectives

1. To understand how to break down a complex project into manageable segments and use of effective project management tools and techniques to arrive at solution and ensure that the project meets its deliverables and is completed within budget and on schedule.
2. To impart knowledge on various components, phases and attributes of a project.
3. To prepare students to plan, develop, lead, manage and successfully implement and deliver projects within their chosen practice area.

2.0 Course Outcomes

On completion of the course, the students will be able to;

1. Understand the selection, prioritization and initiation of individual projects and strategic role of project management.
2. Understand the work breakdown structure by integrating it with organization also the scheduling and uncertainty in projects.
3. Understand risk management planning using project quality tools also the activities like purchasing, acquisitions, contracting, partnering and collaborations related to performing projects.
4. Determine project progress and results through balanced score card approach.
5. Draw the network diagram to calculate the duration of the project and reduce it using crashing.

3.0 Course Content

MODULE – 1

INTRODUCTION

Definition of project, characteristics of projects, understand projects, types of projects, scalability of project tools, project roles Project Selection and Prioritization–Strategic planning process, Strategic analysis, strategic objectives, portfolio alignment–identifying potential projects, methods of selecting projects, financial mode/scoring models to select projects, prioritizing projects, securing and negotiating projects. **08 hours**

MODULE 2

Planning Projects: Defining the project scope, Project scope check list, Project priorities, Work Breakdown Structure (WBS), Integrating WBS with organization, coding the WBS for the information system.

Scheduling Projects: Purpose of a project schedule, historical development, how project schedules are limited and created, develop project schedules, uncertainty in project schedules, Gantt chart.

08 hours

MODULE 3

Resourcing Projects: Abilities needed when resourcing projects, estimate resource needs, creating staffing management plant, project team composition issues.

Budgeting Projects: Cost planning, cost estimating, cost budgeting, establishing cost control.

Project Risk Planning: Risk Management Planning, risk identification, risk analysis, risk response planning,

Project Quality Planning and Project Kickoff: Development of quality concepts, project quality management plan, project quality tools, kickoff project, baseline and communicate project management plan using Microsoft Project for project baselines.

08 hours

MODULE 4

Performing Projects: Project supply chain management:-Plan purchasing and acquisitions, plan contracting, contact types, project partnering and collaborations, project supply chain management.

P**roject Progress and Results:** Project Balanced Scorecard Approach, Internal project, customer, financial issues,

Finishing the project: Terminate project early, finish projects on time, secure customer feedback and approval, knowledge management, perform administrative and contract closure.

08 hours

MODULE 5

Network Analysis: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path method (CPM) to find the expected completion time of a project, floats; PERT for finding expected duration of an activity and project, determining the probability of completing a project, predicting the completion time of project; crashing of simple projects.

4.0 Relevance to future subjects

Sl.No	Semester	Subject	Topics
01	VIII	Project work	Planning Projects, Scheduling Projects, Resourcing Projects, Budgeting Projects and Performing Projects.

5.0 Relevance to Real World

Sl.No	Real World Mapping
01	While working in an industry on project.

6.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Topic: Agile Project Management
02	Tutorial	Topic: Project Manager

03	Tutorial	Topic: Human Factors and Project Team

7.0 Books Used and Recommended to Students

Text Books
1 Project Management Timothy J KloppenborgCengageLearningEdition2009
2 Project Management-A systems approach to planning scheduling and controlling Harold kerzner CBS publication
3 Project Management S Choudhury McGraw Hill Education(India)Pvt.Ltd.NewDelhi2016
Reference Books
1 Project Management Pennington Lawrence McGrawHill
2 Project Management A Moder Joseph and Phillips New Yark Van Nostrand Reinhold
3 Project Management, Bhavesh M. Patel Vikas publishing House
Additional Study material & e-Books
1. "Contemporary project management" by Thimothy J Kloppenberg

8.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References
1) https://en.wikipedia.org/wiki/Project_management
2) https://www.manage.gov.in/studymaterial/PPM-E.pdf
3) https://www.scribd.com/document/475871105/FINAL-Word
4) https://www.planview.com/resources/guide/what-is-project-management/

9.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	Project management journal	https://journals.sagepub.com/toc/pmxa/current
2	International journal of project management	https://www.sciencedirect.com/science/article/pii/S0263786315001027
3	Complexity in project management	https://www.sciencedirect.com/science/article/pii/S1877050917323001
4	Project management planning and control	https://www.sciencedirect.com/book/9780081020203/project-management-planning-and-control

10.0 Examination Note

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIEis40% of the maximum marks (20marksoutof 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20Marks (duration 01hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the10th week of the semester

- Third test at the end of the15th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the Cos and Pos for

20 Marks (duration 01 hour)

- At the end of the13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common/repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods/question paper is designed to attain the different levels of Bloom's tax on my as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled time table, with common question papers for the subject (**duration 03 hours)**

- The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be reduced proportionally to 50 marks
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour)**

- First test at the end of 5th week of the semester
- Second test at the end of the10th week of the semester
- Third test at the end of the15th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz anyone of three suitably planned to attain the Cos and Pos for

20Marks (duration01 hours)

- At the end of the13thweekofthesemester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common/repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods/question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled time table, with common question papers for the subject (**duration 03 hours)**

- The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be reduced proportionally to 50 marks
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
- The students have to answer 5 full questions, selecting one full question from each module.

11.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
Module 1:	1	Introduction to Project Management, Definition of project, characteristics of projects, understand projects	20
	2	types of projects, scalability o project tools	
	3	project roles Project Selection and Prioritization – Strategic planning process	
	4	Strategic analysis, strategic objectives	
	5	portfolio alignment – identifying potential projects	
	6	methods of selecting projects	
	7	financial mode / scoring models to select projects	
	8	Prioritizing projects, Securing and negotiating projects.	
Module 2:	9	**Planning Projects:** Defining the project scope, Project scope checklist	20
	10	Project priorities, Work Breakdown Structure (WBS)	
	11	Integrating WBS with organization, coding the WBS for the information system.	
	12	**Scheduling Projects:** Purpose of a project schedule	
	13	historical development, how project schedules are limited and created	
	14	develop project schedules	
	15	uncertainty in project schedules	
	16	Gantt chart.	
Module 3:	17	**Resourcing Projects:** Abilities needed when resourcing projects, estimate resource needs	20
	18	creating staffing management plant, project team composition issues	
	19	**Budgeting Projects:** Cost planning, cost estimating	
	20	Cost budgeting, establishing cost control.	
	21	**Project Risk Planning**: Risk Management Planning, risk identification, risk analysis, risk response planning	
	22	**Project Quality Planning and Project Kick off:** Development of quality concepts, project quality management plan	
	23	project quality tools, kick off project, baseline and	
	24	Communicate project management plan using Microsoft Project for project baselines.	
Module 4:	25	**Performing Projects and Project supply chain management:** - Plan purchasing and acquisitions, plan contracting	20
	26	Contact types, project partnering and collaborations, project supply chain management.	
	27	**Project Progress and Results:** Project Balanced Scorecard Approach	
	28	Internal project, customer, financial issues	
	29	**Finishing the project:** Terminate project early, finish projects on time	
	30	secure customer feedback and approval	
	31	Knowledge management	
	32	Perform administrative and contract closure.	
Module 5:	33	**Network Analysis:** Introduction	20
	34	network construction - rules	
	35	Fulkerson's rule for numbering the events, AON and AOA diagrams	

	36	Critical path method (CPM) to find the expected completion time of a project floats	
	37	PERT for finding expected duration of an activity and project	
	38	determining the probability of completing a project	
	39	predicting the completion time of project	
	40	Crashing of simple projects.	

12.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book /website /Paper
1	Assignment 1:	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 1& 2 of the syllabus	4	Individual Activity.	Books 1, 2 and 3 of the text book list
2	Assignment 2:	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 3,4 & 5 of the syllabus	9	Individual Activity.	Books 1, 2 and 3 of the text book list

13.0 QUESTION BANK

Module 1

1. What is a project?
2. What is project management?
3. What types of constraints are common to most projects?
4. Which deliverable authorizes the project team to move from Selecting & Initiating to Planning?
5. At what stage of a project life cycle are the majority of the “hands-on” tasks completed?
6. What are the five process groups of project management?
7. What are the 10 project management knowledge areas?
8. What two project dimensions are components of project performance?
9. How do you define project success?
10. How do you define project failure?
11. List four common causes of project failure.
12. What are three common ways of classifying projects?
13. List and describe each step in the strategic planning process.
14. Name five things that may be negotiated between a client company and a contractor company
15. What are some common reasons for project failure?

Module 2

1. List three reasons why understanding stakeholder is important to successful project management.
2. What is the difference between an internal and external stakeholder?
3. Which three criteria should you consider when prioritizing stakeholders?
4. Describe an AGILE “stand-up” meeting.
5. What three tasks comprise the “define scope” process?
6. Why is scope definition important?
7. What are two common causes of scope creep?
8. What does the acronym WBS stand for?
9. What are the advantages of using a WBS?
10. List three ways of organizing a WBS.
11. The lowest level of the WBS is known as?
12. What items are typically included in a work package description?
13. What is rolling wave planning?
14. What is uncontrolled change known as?
15. Why do project teams use change control systems?

16. List the major sections that should be included in a change request form, and tell why each is important.
17. When can the first draft of a project schedule be constructed?
18. What is the difference between an activity and a work package?
19. How can a **Gantt chart** be helpful in project planning?

Module 3

1. In addition to technical skills, what other skill must a project manager have in order to successful resource a project?
2. Why is it important to involve workers in the planning phase of a project when possible?
3. What are two techniques used to compress a project schedule?
4. When crashing a project, what two criteria are considered when deciding which activities to speed up?
5. What type of costs does not depend on the size of a project?
6. During which phase of a project do recurring costs typically occur?
7. What are some examples of expedited costs?
8. What is the purpose of an order of magnitude cost estimate?
9. What is the "time value of money," and why is it relevant to project management?
10. For a routine project, what is a typical percentage of total project costs that should be placed into contingency reserves? For an unusual project?
11. Should a project manager alone identify potential risks for the project? Why or why not?
12. During which stage of a project are most risks typically uncovered?
13. Are both qualitative and quantitative risk analyses used on all projects? Why or why not?
14. What is an example of transferring risk?
15. In the risk register, why should only one person be assigned "owner" of a risk?
16. Identify similarities and differences among TQM, ISO, and Six Sigma. What strengths and weaknesses are inherent in each of these approaches?
17. Discuss the areas of ISO. Which do you feel is most important and why?
18. Describe the process of achieving stakeholder satisfaction. Why is it important to consider stakeholder satisfaction?
19. Describe the three outputs of quality control.
20. List the project quality tools you expect to use on your project. Tell where you plan to use each tool and why it is important.

Module 4

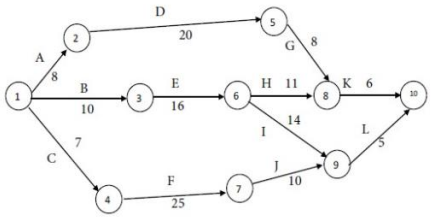
1. Do small businesses often outsource project work? Why or why not?
2. Which is the first of the four processes that make up project procurement management?
3. In supply chain management, what are some other names for the seller? What are some other names for the buyer?
4. List three functional areas that are frequently outsourced by business organizations.
5. What are some potential issues related to outsourcing?
6. What are four potential information sources that organizations can use to identify potential sellers?
7. Describe two methods that can be used to evaluate potential suppliers.
8. What items are generally included in a request for proposal?
9. What is the primary reason for determining project progress and results?
10. Which five aspects of project success are evaluated in the balanced scorecard approach?
11. Give three categories of internal project issues and an example of each.
12. In addition to the WBS, what might trigger project work to be authorized and performed?
13. What is an advantage of letting workers self-control their work?
14. How does one calculate schedule variance?
15. What does cost performance index (CPI) measure?
16. When does a project move into the closing stage?
17. What is validate scope?
18. What is the purpose of a "punch list"?
19. What should a project manager refer back to in order to make sure that all planned work has, in fact, been completed?
20. When might a contract clause be invoked?
21. If an early termination of his project seems likely, what two avenues can a project manager explore to increase the likelihood of being able to continue the project?

Module 5

1. What is network analyses? Write its salient feature.
2. Define following
   i) Pert
   ii) CPM
3. How 20 key project manager actions are organized? Explain.
4. What is material requirement planning (MRP)? define it with suitable example
5. How MRP is a 'push' system while JIT is a 'pull' system? explain it
6. Determine the critical path, the critical activities and the project completion time
   The following details are available regarding a project:

Activity	Predecessor Activity	Duration (Weeks)
A	-	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D,E	4

7. Find out the completion time and the critical activities for the following project:

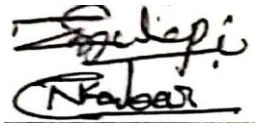


8. Draw the network diagram and determine the critical path for the following project

Activity	Time estimate (Weeks)
1- 2	5
1- 3	6
1- 4	3
2 -5	5
3 -6	7
3 -7	10
4 -7	4
5 -8	2
6 -8	5
7 -9	6
8 -9	4

9. Develop a network diagram for the project specified below

Activity	Immediate Predecessor Activity
A	-
B	A
C, D	B
E	C
F	D
G	E, F

Prepared by	Checked by		
			
Prof. Girish Zulapi & Prof. Nagaraj T. Kambar	**Prof. M A Hipparagi**	**HOD**	**Principal**
Course coordinator	**Module coordinator**		

Subject Title	**PROGRAMMING IN JAVA**		
Subject Code	**21CS654**	**IA Marks**	50
Number of Lecture Hrs / Week	03	**Exam Marks**	50
Total Number of Lecture Hrs	40	**Exam Hours**	03
CREDITS – 03			

FACULTY DETAILS:		
Name: Prof. Prasanna Patil	**Designation:** Asst. Professor	**Experience:** 10.5 Years
No. of times course taught:02	**Specialization:** Computer Science and Engineering	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Computer Science and Engineering	I/II	CPS

2.0 Course Objectives

This course will enable students to

1. Learn fundamental features of object-oriented language and JAVA.
2. To create, debug and run simple Java programs.
3. Learn object-oriented concepts using programming examples.
4. Study the concepts of importing of packages and exception handling mechanism.
5. Discuss the String Handling examples with Object Oriented concepts.

3.0 Course Outcomes

After studying this course, students will be able to

CO	Course Outcome	RBT Level	POs
C320.1	Develop JAVA programs using OOP principles and proper program structuring.	L1, L2, L3	1,2,3,8,10,12
C320.2	Develop JAVA program using packages, inheritance and interface.	L1, L2, L3	1,2,3,8,10,12
C320.3	Develop JAVA programs to implement error handling techniques using exception handling.	L1, L2, L3	1,2,3,8,10,12
C320.4	Demonstrate string handling concepts using JAVA.	L1, L2, L3	1,2,3,8,10,12
Total Hours of instruction		**40**	

4.0 Course Content

Module 1 (8 Hours)

An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and **Arrays:** Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings

Module 2 (8 Hours)**Operators:**

Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, **Control Statements:**Java‟s Selection Statements, Iteration Statements, Jump Statements.

Module 3 (8 Hours)

Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, **A Closer Look at Methods and**

Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, **Inheritance:** Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.

Module 4 **(8 Hours)**

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, **Exception Handling:** Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions.

Module 5 **(8 Hours)**

Enumerations, Type Wrappers: I/O Basics, Reading Console Input, Writing Console Output, The PrintWriter Class, Reading and Writing Files, **String Handling:** The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf( ), Changing the Case of Characters Within a String , Additional String Methods, StringBuffer, StringBuilder.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	VIII	Project work	Java

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Development of a software applications

7.0 Books Used and Recommended to Students

Text Books
1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007. (Chapters 2, 3, 4, 5, 6,7, 8, 9,10, 12,15)
Reference Books
1. Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806.
2. Rajkumar Buyya,SThamarasiselvi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited.
3. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.
4. Anita Seth and B L Juneja, JAVA One step Ahead, Oxford University Press, 2017.

8.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References
1. www.nptelvideos.com/**java**/**java**_video_lectures_tutorials.php
2. https://www.cse.**iit**b.ac.in/~nlp-ai/**java**lect_august2004.html
3. www.nptel.ac.in/courses/106105084/28

9.0 Magazines/Journals Used and Recommended to Students

Sl. No	Magazines/Journals	website
1	Java Magazine - Oracle	www.oracle.com/technetwork/java/javamagazine/
2	Java - IEEE Conferences, Publications, and Resources	https://www.computer.org/software-magazine/
3	Java Developer's Journal - Steven Gould	https://jserd.springeropen.com/

10.0 Examination Note

Assessment Details (both CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall bedeemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:
Three Unit Tests each of 20 Marks (duration 01 hour)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of 10 Marks
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)
6. At the end of the 13th week of the semester
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).
CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:
Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)
1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
The students have to answer 5 full questions, selecting one full question from each module.

11.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
MODULE 1	1	Object-Oriented Programming, A First Simple Program, A Second Short Program,	20%
	2	Two Control Statements, Using Blocks of Code, Lexical Issues,	
	3	The Java Class Libraries, Data Types, Variables	
	4	Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers	
	5	Floating-Point Types, Characters, Booleans, A Closer Look at Literals,	
	6	Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions,	
	7	Arrays	
	8	A Few Words About Strings	
MODULE 2	9	Operators: Arithmetic Operators	20%
	10	The Bitwise Operators,	
	11	Relational Operators, Boolean Logical Operators	
	12	The Assignment Operator, The ? Operator	
	13	Operator Precedence, Using Parentheses	
	14	Control Statements: Java's Selection Statements	
	15	Iteration Statements	
	16	Jump Statements.	
	17	Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables,	

MODULE 3	18	Introducing Methods, Constructors, The this Keyword,	20%
	19	Garbage Collection, The finalize( ) Method, A Stack Class,	
	20	A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects,	
	21	Recursion, Introducing Access Control, Understanding static, Introducing final	
	22	Arrays Revisited, Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy	
	23	When Constructors Are Called, Method Overriding, Dynamic Method Dispatch	
	24	Using Abstract Classes, Using final with Inheritance, The Object Class.	
MODULE 4	25	Packages, Access Protection, Importing Packages,	20%
	26	Interfaces,	
	27	Exception Handling: Exception-Handling Fundamentals, Exception Types, ,	
	28	Uncaught Exceptions, Using try and catch, Multiple catch Clauses,	
	29	Nested try Statements, throw, throws,	
	30	finally, Java's Built-in Exceptions,	
	31	Creating Your Own Exception Subclasses	
	32	Chained Exceptions, Using Exceptions.	
MODULE 5	33	I/O Basics, Reading Console Input, Writing Console Output,	20%
	34	The PrintWriter Class, Reading and Writing Files,	
	35	String Handling: The String Constructors, String Length,	
	36	Special String Operations,Character Extraction, String Comparison,	
	37	Searching Strings, Modifying a String, Data Conversion Using valueOf( ),	
	38	Changing the Case of Characters Within a String	
	39	Additional String Methods,	
	40	StringBuffer, StringBuilder.	

12.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl. No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: Some important University Questions on Module one and two.	Students study the Topics and write the Answers. Get practice to solve questions.	Module one and two of the syllabus	4	Individual Activity. Witten solutions expected.	Text book
2	Assignment 2: Some important University Questions on Module three and four	Students study the Topics and write the Answers. Get practice to solve questions.	Module three and four of the syllabus	9	Individual Activity. Witten solutions expected.	Text book
3	Assignment 3: QUIZ	Students study the Topics and attend the QUIZ.	Module five of the syllabus	14	Individual Activity. Correct answers expected.	Text book, online material

13.0 QUESTION BANK

Module 1:

1. Explain the features of Java.
2. Elucidate how Java is a platform independent language, with neat sketches
3. List and explain Java buzzwords.
4. Explain the process of creating and running Java programs.
5. Explain the structure of a Java program and its keywords with an example.
6. Write & demonstrate a Java program to initialize & display different types of integers & floating type variables.

7. Explain different access specifiers in Java & their scope.
8. Define type casting. Explain with an example.
9. Explain type conversion, with an example.
10. What is type casting? Illustrate with an example. What is meant by automatic type promotion?
11. How are arrays defined in Java? Explain with an example.

Module 2:

1. Discuss operators in Java.
2. What is a jump statement? Explain with examples.
3. Explain :i) >>> ii)short circuit logical operators iii) for each
4. With an example explain the working of >> and >>> (unsigned right shift)
5. Write a Java program to print the factorial of the number 'n' using the "for" loop.
6. Write a program to calculate the average among the elements {8, 6, 2, 7} using "for each" in Java. How is "for each" different from "for" loop?
7. Write a Java program to sum only the first five elements of the array {1,2,3,4,5,6,7,8,9,10} using "for each" version of the for loop.
8. Write a java program to sum only first five elements of the array using for each looping.
9. Explain the operation of the following operators with examples. i) % ii) >>> iii) &&
10. How to declare two dimensional arrays in java? Explain with a simple example.
11. Write a Java program to illustrate the use of multidimensional arrays.

Module 3:

1. Define inheritance. List the different types of inheritance. (Jan-2018)
2. Discuss the following terms with an example: i) super ii) final (Jan-2019)
3. Define inheritance. Explain the multilevel hierarchy with an example program,
4. Write a Java program to define an interface called Area which contains method called Compute( ) and calculate the areas of rectangle (ℓ * b) and triangle (1/2 * b * h) using classes Rectangle and Triangle.
5. With an example program explain the method overriding?
6. Compare and contrast method overloading and method overriding with suitable examples.
7. When constructors are called in the class hierarchy?
8. Distinguish between method overloading and overriding in Java, with suitable examples.

Module 4:

1. Explain the package and its types and import commands in Java with examples.
2. Describe the various levels of access protections available for packages and their implications.
3. Which is the alternative method to implement multiple inheritance in Java? Explain with an example.
4. Explain the role of interfaces while implementing multiple inheritance in Java.
5. Give the basic form of an exception handling block.
6. Define the role of Exception handling in software development.
7. What is an exception? Give an example for nested try statements.
8. Define exceptions. Explain the exception handling mechanism with an example.
9. Explain Java's built-in exceptions.
10. What is the importance of the clause finally?
11. Create a try block that is likely to generate three types of exception and incorporate necessary catch block to catch and handle them.
12. Write a Java program for illustrating the exception handling when a number is divided by zero and an array has a negative index value.

Module 5:

1. Write a note about a PrintWriter Class.
2. Write a note on Native Methods.
3. Write a note on Special String Operations.
4. Write a note on StringBuffer.
5. Write a note on StringBuilder.

14.0 University Result

Examination	Total Students	PASS (P)	FAIL (F)	% Passing
2021 Feb/March	**41**	**40**	**01**	**97.5 %**
2022 July	**23**	**23**	**00**	**100%**
2023 June / July	**41**	**39**	**02**	**95.12%**

Prepared by	Checked by		
			
Prof. P. G. Patil	**Prof. M. G. Huddar**	**HOD**	**Principal**

Subject Title	**Sensors & Actuators**		
Subject Code	21EC655	**IA Marks**	50
Number of Lecture Hrs/ Week	03 L	**Exam Marks**	50
Total Number of Lecture Hrs	40	**Exam Hours**	03

FACULTY DETAILS:		
Name: Prof. K.S.Patil.	**Designation:** Asst. Professor	**Experience:30**yrs
No. of times course taught:00	**Specialization:**VLSI & Embedded Systems	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	ECE	III	Sensors & Instrumentation
02	ECE	III	Electronic Principles & Circuits

2.0 Course Objectives

1. To provide the fundamental knowledge about sensors and measurement system.
2. To impart the knowledge of static and dynamic characteristics of instruments and understand the Factors in selection of instruments for measurement..
3. To discuss the principle, design and working of transducers for the measurement of physical time varying quantities.
4. Understand the working of various actuators suitable in industrial process control systems.
5. Understand the principle and application of smart sensors.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to draw and analyze.

	Course Outcome	Cognitive Level	POs
C321.1	Discuss the fundamental concepts related to sensors and measurement, functional elements of System	U	PO1, PO2, PO4 PO5,PO7
C321.2	Interpret and analyze the static and dynamic characteristics of instruments.	U	PO2, PO3, PO5,PO6
C321.3	Elucidate the working principle and usage of different transducers,for temperature, displacement	U	PO2, PO3,PO4 PO5,PO6, PO7
C321.4	Discuss the principle and working of different types of actuators used in industrial application.	U	PO3, PO4, PO5 PO6,PO7,PO12
C321.5	Discuss the principle and working of strain, force and torque measurement.	U	PO1, PO2, PO10 PO12
Total Hours of instruction		**40**	

4.0 Course Content

Course Content:

Module	Teaching Hours	Bloom's Taxonomy (RBT) level
Module 1: **Sensors and measurement system**: Sensors and transducers, Classifications of transducers-primary & secondary, active & passive, analog and digital transducers. Smart sensors. **Measurement:** Definition, significance of measurement, instruments and measurement systems.mechanical, electrical and electronic instruments. Elements of generalized measurement system withexample. Input-output configuration of measuring instruments and measurement systems, methods of correction for interfering and modifying inputs.	**08 Hours**	**L1, L2,L3**
Module 2: **Static and Dynamic Characteristics**: Static calibration and error calibration curve, accuracy andprecision, indications of precision, static error, scale range and scale span, reproducibility and drift,repeatability, signal to noise ratio, sensitivity, linearity, hysteresis, threshold, dead zone and dead time,resolution, signal to noise ratio, factors influencing the choice of transducers/instruments. **Dynamic response** – Dynamic characteristics, Transfer function of generalized first order system, timeconstant. Transfer function of generalized second order system, natural frequency and Damping ratio.	**08 Hours**	**L1,L2,L3**
Module 3: **Measurement of Temperature**: RTD, Thermistor, Thermocouple, laws of thermocouple, Thermopile,AD590. **Measurement of Displacement**: Introduction, Principles of Transduction, Variable resistance devices, variable Inductance Transducer, Variable Capacitance Transducer, Hall Effect Devices, Proximity Devices,Digital Transducer.	**08 Hours**	**L1,L2,L3**
Module 4: **Measurement of Strain**: Introduction, Types of Strain Gauges, Theory of operation of resistance strain gauges, Types of Electrical Strain Gauges –Wire gauges, unbounded strain gauges, foil gauges,semiconductor strain gauges (principle, types & list of characteristics only), Strain gauge Circuits –Wheatstone bride circuit, Applications. **Measurement of Force & Torque**: Introduction, Force measuring sensor –Load cells – column typesdevices, proving rings, cantilever beam, pressductor. Hydraulic load cell, electronic weighing system. **Torque measurement**: Absorption type, transmission type, stress type & deflection type.	**08 Hours**	**L1,L2,L3**
Module 5: **Actuators and process control system**: Introduction. Block diagram and description of process controlsystem with an example. Introduction, Block diagram of Final control operation, Signal conversionsanalog, digital, pneumatic signal. Actuators, Control elements. **Electrical actuating systems**: Solid-state switches, Solenoids, Electric Motors-Principle of operationand its application: D.C motors, AC motors, Synchronous Motor, Stepper motors.Pneumatic Actuators: Principle and working of pneumatic actuators. (Numerical problems on thetopic). **Hydraulic Actuators**: Principle and working of Hydraulic actuators. (Numerical problems on the topic).	**08 Hours**	**L1,L2,L3**

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	VII	Open Elective	Bio Medical Signal Processing
02	VIII	Projects on VLSI	Projects and Research

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Analyze different types of sensors
02	Design of different types Electrical actuating Systems

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Topic: Measuring Instruments
02	NPTEL	Demonstration and Application

8.0 Books Used and Recommended to Students

Text Books

Text Books:

1. Electrical and Electronic Measurements and Instrumentation, A K Sawhney, 17th Edition, (Reprint 2004), Dhanpat Rai & Co. Pvt. Ltd., 2004.
2. Instrumentation: Devices and Systems, C S Rangan, G R Sarma, V S V Mani, 2nd Edition (32 Reprint), McGraw Hill Education (India), 2014.
3. Process Control Instrumentation Technology by C D Johnson, 7th Edition, Pearson Education Private Limited, New Delhi 2002.

Reference Books

Reference Books:

1. Sensors and Actuators By Francsco

Additional Study material & e-Books

1. VTU on line notes.

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

https://www.nist.gov › how-do-you-measure-it › how-d...
https://technav.ieee.org › topic › sensors-and-actuators
https://apmonitor.com › pdc › index.php › Main › Feed...
https://nptel.co.in
https://cti-ct.com › article_75_Industrial-Valves-Actuato...
https://www.edx.org/school/iitbombayx?utm_source=bing&utm_medium=cpc&utm_term=iit-bombay&utm_campaign=partner-iit-bombay

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	IEEE Xplorer	http://ieee.com
2	International Journal of Science and Technology	http://www.sciencedirect.com/science/journal/00207683
3	Journal of Communication Engineering	http://ieee.com

11.0 Examination Note

Assessment Details (both CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:
Three Unit Tests each of **20 Marks (duration 01 hour**)
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester
Two assignments each of **10 Marks**
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20. **Marks** (**duration 01 hours**)
6. At the end of the 13th week of the semester
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).
CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:
Theory SEE will be conducted by university as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**
1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
The students have to answer 5 full questions, selecting one full question from each module.
Marks scoredout of 100 shall be reduced proportionally to 50 marks

12.0 Course Delivery Plan

Course Delivery Plan:

MODULE	LECTURE NO.	CONTENT OF LECTURE	% OF PORTION
1	1	Sensors and transducers, Classifications of transducers-primary&	20
	2	active & passive, analog and digital transducers.	
	3	Definition, significance of measurement ,instruments and measurement	
	4	mechanical, electrical and electronic instruments.	
	5	Elements of generalized measurement system with Examples	
	6	Input-output configuration of measuring instruments and measurement	
	7	Methods of correction for interfering and modifying inputs.	
	8	Over view, continued	

2	9	Static calibration and error calibration curve,	
	10	accuracy and precision, indications of precision, static error,	
	11	scale range and scale span, reproducibility and drift, repeatability, signal to	
	12	sensitivity, linearity, hysteresis, threshold, dead zone and dead time,	
	13	resolution, signal to **noise ratio, factors**	
	14	factors influencing the choice of transducers/instruments.	
	15	Dynamic characteristics, Transfer function of generalized first order	
	16	Transfer function of generalized second order system frequency Damping	
3	17	RTD, Thermistor, Thermocouple, laws of thermocouple,	60
	18	Thermopile, AD590.	
	19	Measurement of Displacement: Introduction, Principles of Transduction,	
	20	Variable resistance devices,	
	21	variable Inductance Transducer, Variable Capacitance Transducer,	
	22	Hall Effect Devices,	
	23	Proximity Devices,	
	24	Digital Transducer.	
4	25	Types of Strain Gauges, Theory of operation	80
	26	Types of Electrical Strain Gauges –Wire gauges, unbounded strain gauges,	
	27	semiconductor strain gauges	
	28	Strain gauge Circuits Wheatstone bride circuit, Applications.	
	29	Introduction, Force measuring sensor–Load cells	
	30	column types devices, proving rings,	
	31	cantilever beam, pressductor. Hydraulic load cell,	
	32	Torque measurement: Absorption type, transmission type, stress type	
5	33	Block diagram and description of process control	100
	34	Block diagram of Final control operation,	
	35	Signal conversions analog, digital, pneumatic signal.	
	36	Actuators, Control elements.	
	37	Solid-state switches, Solenoids, Electric Motors-	
	38	D.C motors, AC motors, Synchronous Motor, Stepper motors.	
	39	Principle and working of pneumatic actuators.	
	40	Principle and working of Hydraulic actuators.	

13.0 QUESTION BANK

MODULE -1

1. Define Sensor & transducer.
2. Give the classification of transducers
3. Define, significance of measurement
4. Explain mechanical, electrical and electronic instruments
5. Explain Input-output configuration of measuring instruments and measurement systems
6. Mention Methods of correction for interfering and modifying inputs

MODULE -2

1. Explain Static calibration and error calibration curve
2. Define accuracy and precision
3. Define static error, scale range and scale span, reproducibility
4. Explain signal to noise ratio, sensitivity, linearity, hysteresis
5. Explain factors influencing the choice of transducers/instruments.
6. Explain Dynamic characteristics, Transfer function of generalized first order system

MODULE -3

.1. Explain RTD
2. Explain , Thermostat
3. Explain Thermocouple, laws of thermocouple
4. Explain Thermopile,AD590
5. Write a note Principles of Transduction
6. Explain Variable resistance devices
7. Explain Transfer function of generalized second order system,

MODULE -4

1. What are Types of Strain Gauges
2. Explain Theory of operation of resistance strain gauges.
3. Explain, foil gauges, semiconductor strain gauges
4. Explain Strain gauge Circuits
5. Explain Wheatstone bride circuit, with Applications.
6. Mention the applications of resistance strain gauges,
7. Explain Force measuring sensor –Load cells – column types devices
8. Explain Torque measurement by Absorption type.
9. Explain Torque measurement: by transmission type, stress type & deflection type.
10. Expalin Torque measurement: by stress type & deflection type.

MODULE-5

1. Explain Block diagram and description of process control system with an example.
2. Explain Block diagram of Final control operation
3. Expalin , Signal conversions analog, digital, pneumatic signal. Actuators, Control elements.
4. Explain Solid-state switches, Solenoids
5. Explain Principle of operation and its application: D.C motors,
6. Explain Principle of operation and its application AC motors
7. Explain Principle of operation and its application Synchronous Motor.
8. Explain Principle of operation and its application, Stepper motors
9. Explain : Principle and working of pneumatic actuators
10. Mention the Applications of Stepper Motor

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		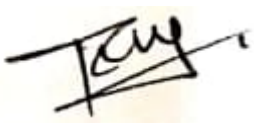	
Prof. K.S.Patil	**Prof. D.M.Kumbar**	**HOD**	**Principal**

Subject Title	**DIGITAL SIGNAL PROCESSING LABORATORY**		
Subject Code	**21EEL66**	**CIE Marks**	50
No of Practical Hrs / Week	0:0:2:0	**SEE Marks**	50
RBT Levels	L1,L2,L3	**Exam Hours**	03
			CREDITS – 02

FACULTY DETAILS:		
Name: Prof. Amit U.Neshti	**Designation:** Asst. Professor	**Experience:** 14 Years
No. of times course taught: 04	**Specialization:** Digital Electronics	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Electrical & Electronics Engineering	IV	Operation amplifiers and linear IC's

2.0 Course Objectives

1. To help the students in developing software skills.
2. To explain the use of MATLAB/Scilab/Python software in conducting the experiments of signal processing laboratory. evaluating the DFT and IDFT of given sequence
3. To explain generation of different types of signals both in continuous and discrete time domains.
4. To explain verification of linear and circular convolutions of given sequences.
5. To explain evaluating the DFT and IDFT of given sequence
6. To design and implementation of IIR and FIR filters for given frequency specifications and realize them.

3.0 Course Outcomes

The student, after successful completion of the course, will be able to

CO	Course Outcome	Cognitive Level	Pos
C323.1	Conduct sampling of signals in time and frequency domains.	L1,L2,L3	1,2,8,9,10,12
C323.2	Evaluate the impulse response of a system.	L1,L2,L3	1,2,8,9,10,12
C323.3	Obtain convolution of given sequences to evaluate the response of a system.	L1,L2,L3	1,2,8,9,10,12
C323.4	Compute DFT and IDFT of a given sequence using the basic definition and/or fast methods.	L1,L2,L3	1,2,8,9,10,12
C323.5	Provide a solution for a given difference equation.	L1,L2,L3	1,2,8,9,10,12
C323.6	Design and implement IIR and FIR filters	L1,L2,L3	1,2,8,9,10,12
Total Hours of instruction		**42**	

4.0 Course Content

Experiments

1	Generation of different signals in both continuous and discrete time domains.
2	Verification of Sampling Theorem both in time and frequency domains
3	To perform basic operations on given sequences- Signal folding, evaluation of even and odd.
4	Evaluation of impulse response of a system.
5	Solution of a difference equation.
6	Evaluation of linear convolution and circular convolution of given sequences.
7	Computation of N- point DFT and IDFT of a given sequence by use of (a) Defining equation; (b) FFT method.
8	Evaluation of circular convolution of two sequences using DFT and IDFT approach.
9	Design and implementation of IIR filters to meet given specification (Low pass, high pass, band pass and band reject filters).
10	Design and implementation of FIR filters to meet given specification (Low pass, high pass, band pass and band reject filters) using different window functions.
11	Design and implementation of FIR filters to meet given specification (Low pass, high pass, band pass and band reject filters) using frequency sampling technique.
12	Realization of IIR and FIR filters.

5.0 Relevance to future subjects

SL. No	Semester	Subject	Topics / Relevance
01	VIII	Project work	Automation

6.0 Relevance to Real World

SL. No	Real World Mapping
01	Digital photo camera, MP3 players to automobiles.
02	Speech processing, Image processing.
03	Application of audio processing.

7.0 Books Used and Recommended to Students

Text Books
1. Introduction to Digital Signal Processing, Johnny R. Johnson, Pearson, 1st Edition, 2016.
Reference Books
1. "Digital Signal Processing – Principles, Algorithms, and Applications, Jhon G. Proakis, Dimitris G. Manolakis Pearson 4th Edition, 2007. 2. Digital Signal Processing A.NagoorKani McGraw Hill, 2nd Edition, 2012. 3. Digital Signal Processing, Shaila D. Apte, Wiley ,2nd Edition, 2009, 4. Digital Signal Processing, Ashok Amberdar, Cengage, 1stEdition, 2007
Additional Study material & e-Books

8.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References	
1.	http://freevideolectures.com/Course/2339/Digital-Signal-Processing-IITKharagpur
2.	https://www.youtube.com/playlist?list=PLaJppqXMef2ZHIKM4vpwHIAWyRmw3TtSf
3.	https://ocw.mit.edu/resources/res-6-008-digital-signal-processing-spring-2011/

9.0 Magazines/Journals Used and Recommended to Students

SL.No	Magazines/Journals	Website
1	Elsevier Journal	https://www.journals.elsevier.com/digital-signal-processing/
2	ICGST Journal of Digital signal processing	http://www.icgst.com/journals/journal.aspx?subid=45
3	InternationalJournal of Advancements in Digital Signal Processing	http://journals.theired.org/ijdsp.html
4	Science Direct	http://www.sciencedirect.com/science/journal/10512004

10.0 Examination Note

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. Theminimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination(SEE).

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling

the laboratory session and is made known to students at the beginning of the practical session.

- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge willcarry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by theUniversity

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictlyadhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointlyby examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners. General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scoredmarks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by theexaminers)

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.The duration of SEE is 03 hours

Rubrics suggested in Annexure-II of Regulation book

11.0 Course Delivery Plan

Expt No	Lecture / Pract. No	Name of the Experiment	% Of Portion
1	1	Generation of different signals in both continuous and discrete time domains.	8.33%
2	2	Verification of Sampling Theorem both in time and frequency domains	8.33%
3	3	To perform basic operations on given sequences- Signal folding, evaluation of even and odd.	8.33%
4	4	Evaluation of impulse response of a system.	8.33%
5	5	Solution of a difference equation.	8.33%
6	6	Evaluation of linear convolution and circular convolution of given sequences.	8.33%
7	7	Computation of N- point DFT and IDFT of a given sequence by use of (a) Defining equation; (b) FFT method.	8.33%
8	8	Evaluation of circular convolution of two sequences using DFT and IDFT approach.	8.33%
9	9	Design and implementation of IIR filters to meet given specification (Low pass, high pass, band pass and band reject filters).	8.33%
10	10	Design and implementation of FIR filters to meet given specification (Low pass, high pass, band pass and band reject filters) using different window functions.	8.33%
11	11	Design and implementation of FIR filters to meet given specification (Low pass, high pass, band pass and band reject filters) using frequency sampling technique.	8.33%
12	12	Realization of IIR and FIR filters.	8.33%

12.0 QUESTION BANK

1. What is MATLAB?
2. What are the applications of MATLAB?
3. State sampling theorem.
4. What is meant by Nyquist rate and Nyquist criteria?
5. Explain scaling and superposition properties of a system.
6. What is meant by linearity of a system and how it is related to scaling and superposition?
7. What is impulse function?
8. What is meant by impulse response?
9. What is energy signal? How to calculate energy of a signal?
10. What is power signal? How to calculate power of a signal?
11. Differentiate between even and odd signals.
12. Explain time invariance property of a system with an example.
13. What is memory less system?
14. When a system is said to have memory?
15. What is meant by causality?
16. When a system is said to have memory?
17. What is meant by causality?
18. Explain linear convolution and circular convolution.
19. What is the length of linear and circular convolutions if the two sequences are having the length n1 and n2?
20. What are Fourier series and Fourier transform?
21. What are the advantages and special applications of Fourier transform, Fourier series, Z transform and Laplace transform?
22. Differentiate between DTFT and DFT. Why it is advantageous to use DFT in computers rather than DTFT?
23. What is cross-correlation?
24. What are the advantages of using autocorrelation and cross correlation properties in signal processing fields?
25. How auto-correlation can be used to detect the presence of noise?
26. Differentiate between IIR filters and FIR filters.
27. What is the procedure to design a digital Butterworth filter?
28. What is the difference between Butterworth, Chebyshev I and Chebyshev II filters?
29. What are difference equations and differential equations?
30. What is non real time processing?
31. What is a Digital Signal Processor (DSP)?
32. What is meant by real time processing?

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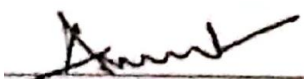		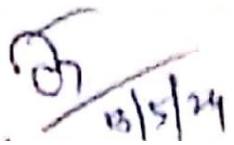	
Prof. Amit U.Neshti	**Prof. Mahesh Yenagimath**	**HOD**	**Principal**