GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University)

VISAKHAPATNAM * HYDERABAD * BENGALURU

Accredited by NAAC with A^{++} Grade

GITAM School of Core Engineering

REGULATIONS AND SYLLABUS

2 Year Postgraduate Programme

PEECE04: M.Tech. Signal Processing and Communications

w.e.f. 2025-26 Admitted Batch

Academic Regulations

Applicable for the Postgraduate Programmes in the School of Core Engineering

https://www.gitam.edu/academics/academic-regulations

Vision

GITAM will be an exceptional knowledge-driven institution advancing on a culture of honesty and compassion to make a difference to the world.

Mission

1. Build a dynamic application-oriented education ecosystem immersed in holistic development.
2. Drive impactful integrated research programmes to generate new knowledge guided by integrity, collaboration, and entrepreneurial spirit.
3. Nurture valuable futures with global perspectives for our students by helping them find their ikigai.
4. Permeate a culture of kindness within GITAM, fostering passionate contributors.

Quality Policy

To achieve global standards and excellence in teaching, research, and consultancy by creating an environment in which the faculty and students share a passion for creating, sharing and applying knowledge to continuously improve the quality of education.

Department of
Electrical, Electronics and Communication Engineering

VISION

To excel in Electrical, Electronics and Communication Technologies cultivating innovation with socio-ethical commitment

MISSION

M1: Empower the students with knowledge to face real-world challenges for holistic development.
M2: Conduct multidisciplinary research that makes an impact on society, addressing key challenges through innovative solutions.
M3: Foster a culture emphasizing empathy, respect, commitment upholding the ethical standards

PEECE04: M. Tech. Signal Processing and Communications

(w.e.f. 2025-26 Admitted Batch)

Program Educational Objectives

PEO 1: Graduates will acquire advanced knowledge and practical skills in digital communication, signal processing, and embedded systems to design and implement effective engineering solutions.

PEO 2: Graduates will be capable of conducting independent research, utilizing modern tools and platforms, and contributing to innovation in communication and signal processing domains.

PEO 3: Graduates will engage in continuous learning through higher education, professional certifications, or self-directed study to stay abreast of technological advances and career growth.

PEO 4: Graduates will demonstrate leadership, teamwork, and ethical responsibility while addressing societal and environmental challenges through technology-driven solutions.

Mission / PEO	PEO1	PEO2	PEO3	PEO4
M1	H	M	M	L
M2	L	H	L	L
M3	L	L	M	H

H – High, M – Medium, L – Low

Programme Outcomes

Upon successful completion of MTech Signal Processing and Communications programme, students will be able to

PO1: Independently carry out research /investigation and development work to solve practical problems

PO2: Communicate technical concepts effectively through technical seminars, research presentations, and written reports.

PO3: Apply advanced knowledge of signal processing, digital and wireless communication, and embedded systems to solve complex engineering problems.

PO4: Identify, formulate, and analyze engineering problems using mathematical models and simulations to develop sustainable solutions.

PO5: Demonstrate ethical behavior, professional responsibility, and a commitment to sustainable and inclusive technological development.

PO6: Work effectively as an individual and in multidisciplinary teams, demonstrating leadership, lifelong learning and innovation in signal processing, communications and embedded systems domain.

M. Tech. Signal Processing and Communications

Department of Electrical, Electronic and Communication Engineering

Effective from academic year 2025-26 admitted batch

I Semester

S.No	Course Code	Course Title	Category	L	T	P	C
1	24EECE6001	Mathematical Foundations for Signal Processing and Communication Engineers	PC	3	0	0	3
2	24EECE6011	Advanced Signal and Image Processing	PC	3	0	0	3
3	24EECE6021	Advanced Digital Communications	PC	3	0	0	3
4	24EECE70XX	Program Elective-I	PE	3	0	0	3
5	24EECE70XX	Program Elective-II	PE	3	0	0	3
6	19EMC741	Research Methodology & IPR	MC	2	0	0	2
7	24EECE6031	Advanced Digital Communication Laboratory	PC	0	0	4	2
8	24EECE6041	Embedded Systems Design Laboratory	PC	0	0	4	2
9	19EAC7XX	Audit Course I	AC	2	0	0	0
							21

II Semester

S.No	Course Code	Course Title	Category	L	T	P	C
1	24EECE6051	Information Theory and Coding	PC	3	0	0	3
2	24EECE6061	Mobile Networks	PC	3	0	0	3
3	24EECE70XX	Program Elective – III	PE	3	0	0	3
4	24EECE70XX	Program Elective –IV	PE	3	0	0	3
5	19EOE7XX	Open Elective	OE	3	0	0	3
6	19EEC792	Technical Seminar	PC	0	0	4	2
7	24EECE6071	RTOS Laboratory	PC	0	0	4	2
8	24EECE6081	Wireless Communication Laboratory	PC	0	0	4	2
9	19EAC7XX	Audit Course II	AC	2	0	0	0
10	HSMCH102	Universal Human Values 2: Understanding Harmony*	HS	2	1	0	3
							24

* This course could also be offered during 3rd or 4th Semester

III Semester

S. No	Course Code	Course Title	Category	L	T	P	C
1	19EEC891	Project Work-I	Project	0	0	20	10
							10

IV Semester

S. No	Course Code	Course Title	Category	L	T	P	C
1	19EEC892	Project Work-II	Project	0	0	32	16
							16

M. Tech. Signal Processing and Communications
Number of Credits

Semester	I	II	III	IV	Total
Credits	21	24	10	16	**71**

AUDIT COURSES I & II

S.No	Course Code	Course Title	Category	L	T	P	C
1	19EAC741	English for Research Paper Writing	AC	2	0	0	0
2	19EAC742	Disaster Management	AC	2	0	0	0
3	19EAC743	Sanskrit for Technical Knowledge	AC	2	0	0	0
4	19EAC744	Value Education	AC	2	0	0	0
5	19EAC745	Constitution Of India	AC	2	0	0	0
6	19EAC746	Pedagogy Studies	AC	2	0	0	0
7	19EAC747	Stress Management by Yoga	AC	2	0	0	0
8	19EAC748	Personality Development through Life Enlightenment Skills	AC	2	0	0	0
9	19EAC750	Developing Soft Skills and Personality	AC	2	0	0	0

OPEN ELECTIVE

S.No	Course Code	Course Title	Category	L	T	P	C
1	19EOE742	Business Analytics	OE	3	0	0	3
2	19EOE746	Operations Research	OE	3	0	0	3
3	19EOE748	Cost Management of Engineering Projects	OE	3	0	0	3
4	19EOE752	Waste to Energy	OE	3	0	0	3
5	19EOE758	C Based VLSI Design	OE	3	0	0	3
6	19EOE756	Wind Energy	OE	3	0	0	3
7	19EOE762	Web Technologies	OE	3	0	0	3

PROGRAMME ELECTIVES
(Choose any 4 courses under Programme Elective I – IV)

S.No	Course Code	Course Title	Category	L	T	P	C
1	24EECE7001	FPGA based System Design	PE	3	0	0	3
2	24EECE7011	Detection and Estimation Theory	PE	3	0	0	3
3	24EECE7021	RF Engineering	PE	3	0	0	3
4	24EECE7031	Advanced Wireless and 5G Communication	PE	3	0	0	3
5	24EECE7041	Software Defined Radios	PE	3	0	0	3
6	24EECE7051	Radar Systems	PE	3	0	0	3
7	24EECE7061	RTOS, Linux Shell Scripting and Embedded Linux Device Drivers	PE	3	0	0	3
8	24EECE7071	ARM Controllers and Embedded C Programming	PE	3	0	0	3

19EMC741: RESEARCH METHODOLOGY AND IPR

L T P C
2 0 0 2

This course introduces the student, to the fundamentals of research, research process, technical writing and intellectual property rights. Students will be able to use this knowledge to gain interest in their subject area and pursue their career in research.

Course Objectives:

- To familiarize the meaning, objectives and sources of research
- To acquaint the student with the importance and methods of literature review/research ethics
- To impart the knowledge of technical writing for preparing reports, presentations, research proposals, conference/journal publications
- To introduce the terminology and process of obtaining intellectual property rights
- To expose the intricacies in the process of obtaining patent rights

Unit I **5L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- define the meaning of a research problem(L2).
- list the different sources of research problem(L1).
- enumerate the different criteria of good research and list the different errors in selecting research problem(L4).
- contrast the different approaches of research(L3).
- compare the different methods for data collection and analysis(L5).

Unit II **5L**

Effective literature studies approaches, analysis Plagiarism, Research ethics.

Learning Outcomes:

After the completion of this unit, the student will be able to

- list and elaborate the different steps of the research process(L1).
- explain the importance of carrying out an effective literature review (L3).
- identify the research gaps from literature review(L4).
- describe the ethical principles to be following during research process and authorship(L2).
- define the terminology and list the methods to avoid being accused of plagiarism(L2).
- list the different types of research misconduct(L5).

Unit III **5L**

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Learning Outcomes:

After the completion of this unit, the student will be able to

- list the attributes, reasons and guidelines for effective technical writing (L3).
- contrast between conference paper, technical presentation and journal paper (L2).
- choose a particular research contribution for patenting or journal publication (L4).
- define the terminology related to citation, citation index, h-index etc (L1).

Unit IV **5L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- describe the codes and standards in building intellectual property rights(L3).
- list the subject, importance and requirements for of patentability(L5).
- explain the process of patenting and commercialization in academia(L1).
- enumerate the procedure for application preparation, filing and grant of Patents(L2).
- define the terminology related to citation, citation index, h-index etc(L4).

Unit V **8L**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. **New Developments in IPR**: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Learning Outcomes:

After the completion of this unit, the student will be able to

- explain the scope of patent rights (L1).
- describe the process for licensing and transfer of technology (L3).
- identify the sources of patent information and databases (L2).
- elaborate the administration of patent system (L5).
- describe the new developments in IPR in computer software, biological systems etc (L4).

Text Book(s):

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for Science and engineering students”, Tata Mcgraw Hill India, 2013.
2. Ranjit Kumar, “Research Methodology: A Step by Step Guide for beginners”, 2/e, Prentice Hall of India, 2013.

References:

1. Halbert, “Resisting Intellectual Property”, Taylor and Francis Limited, 2007.
2. Mayall, “Industrial Design”, McGraw Hill, 1992.
3. Niebel, “Product Design”, McGraw Hill, 1974.
4. Asimov, “Introduction to Design”, Prentice Hall, 1962.
5. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, 2016
6. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand Publishers, 2008

Course Outcomes:

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

- define the meaning, sources, approaches for research problems (L2).
- explain the guidelines for carrying out effective literature review and identify research gaps (L1).
- describe effective guidelines for preparing technical reports, research publications, presentations and research proposals (L4).
- describe the codes, standards and process of obtaining intellectual property rights (L3).
- enumerate the new developments of IPR in engineering systems (L4).

19EEC792: TECHNICAL SEMINAR

L	T	P	C
0	0	4	2

Each student shall survey a technical topic related to a chosen specialization and prepare/submit a report in a specified format. Each student has to prepare a power point presentation on a selected technical topic with a novelty and get it evaluated by the faculty assigned for this purpose.

HSMCH102 - UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY

L T P C
2 1 0 3

Human Values Courses: During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.

Course Objectives:

1. Development of a holistic perspective based on self- exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

COURSE TOPICS: The course has 28 lectures and 14 practice sessions in 5 modules:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I.
2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.
2. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility.
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).
4. Understanding the characteristics and activities of 'I' and harmony in 'I'.
5. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
6. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available tome. Identifying from one's own life.

Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Module 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

1. Understanding values in human-human relationship; meaning of Justice (nine

universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
2. Understanding the meaning of Trust; Difference between intention and competence
3. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
4. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
5. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature.
3. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space.
4. Holistic perception of harmony at all levels of existence.
5. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
5. Case studies of typical holistic technologies, management models and production systems
6. Strategy for transition from the present state to Universal Human Order:
7. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
8. At the level of society: as mutually enriching institutions and organizations
9. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. To discuss the conduct as an engineer or scientist etc.

READINGS:

Text Book

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

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

MODE OF CONDUCT (L-T-P-C 2-1-0-3 or 2L:1T:0P 3 credits): Lectures hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analysing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self- observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations.

Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

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

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses.

This course is to be taught by faculty from every teaching department, including HSS faculty.

Teacher preparation with a minimum exposure to at least one 8- day FDP on Universal Human Values is deemed essential.

ASSESSMENT:
This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation.

Example:
Assessment by faculty mentor: 10 marks
Self-assessment: 10 marks
Assessment by peers: 10 marks
Socially relevant project/Group Activities/Assignments: 20 marks Semester End Examination: 50 marks
The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.

OUTCOME OF THE COURSE:

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

This is only an introductory foundational input. It would be desirable to follow it up by
a) faculty-student or mentor-mentee programs throughout their time with the institution
b) Higher level courses on human values in every aspect of living. E.g. as a professional

19EAC741: ENGLISH FOR RESEARCH PAPER WRITING

L T P C
2 0 0 0

This course introduces the student, to the different aspects of research paper writing including planning, preparation, layout, literature review write-up etc. Specifically, the perspective and style of writing in different sections of a research paper is highlighted. Students will have exposed to English language skills relevant to research paper writing.

Course Objectives:

- To write clearly, concisely and carefully by keeping the structure of the paper in mind.
- To use standard phrases in English and further improve his command over it.
- To write with no redundancy, no ambiguity and increase the readability of the paper.
- To plan and organize his paper by following a logical buildup towards a proper conclusion.
- To decide what to include in various parts of the paper.
- To write a suitable title and an abstract in order to attract the attention of the reader.
- To identify the correct style and correct tense.
- To retain the scientific value of the paper by using minimum number of words.

Unit I **5L**

Planning and Preparation, Word Order, breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

Learning Outcomes:

After the completion of this unit, the student will be able to

- to know the expectations of various journals and referees(L2).
- to know the typical structure of a paper(L1).
- learn to put words in a sentence in the correct order (L4).
- to write short and clear sentences from the very beginning of the paper(L5).
- to increase the readability of the paper by making it easy to read and 100% clear(L3).
- learn to be concise without losing any important content(L5).
- to avoid some typical grammar mistakes made in research papers(L1).

Unit II **5L**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction.

Learning Outcomes:

After the completion of this unit, the student will be able to

- learn to make useful contribution worth recommending for publication (L1).
- learn good use of language to make readers notice the key findings (L3).
- learn to anticipate or predict possible objections to the claims made in the paper(L5).

- to understand what is plagiarism, and how to paraphrase other people's work (L2). learn to attract the right kind of readers with a suitable title(L4).
- learn to sell the abstract to potential readers by attracting their curiosity (L4).

Unit III **6L**

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check. key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

Learning Outcomes:

After the completion of this unit, the student will be able to

- have a deep knowledge about everything that has been previously written on the topic and decide what is important to know in Introduction(L2).
- learn to provide the right amount of literature regarding the sequence of events leading up to the current situation in the Literature review(L1).

Unit IV

6L

Writing Skills: skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.

Learning Outcomes:

After the completion of this unit, the student will be able to

- learn to describe the materials used in experiments and/or the methods used to carry out the research (L1).
- the key skill is in reporting the results simply and clearly (L2).
- learn to structure the Discussion and satisfy the typical requirements of the referees (L1).
- learn to provide a clear and high-impact take-home message in the conclusion (L4).

Unit V

6L

Good Paper Writing: Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

Learning Outcomes:

After the completion of this unit, the student will be able to

- learn various lists of frequently used phrases that have a general acceptance in all disciplines and use in specific sections of the paper (L1).
- learn various kinds of things one should look for when doing the final check (L2).

Text Book (s):

1. Goldbort R, Writing for Science, Yale University Press, 2006
2. Day R, How to Write and Publish a Scientific Paper, Cambridge University Press, 2006 3. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM, Highman, 1998.

References:

1. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

Course Outcomes:

By the end of the course the students will be able to:

- frame the structure of the paper precisely (L2).
- improve his command over English by using standard phrase (L3).
- avoid repetition and mistakes in the paper and increase its readability (L3).
- organize the paper logically towards a proper conclusion (L4).
- decide on the content to be included in various parts of the paper (L5).
- identify whether to use personal or impersonal style in the paper (L5).
- express the content in a clear and concise way (L5).
- attract the attention of the reader by providing a suitable title and an appropriate abstract (L5).

19EAC742: DISASTER MANAGEMENT

L T P C
2 0 0 0

This course is intended to provide fundamental understanding of different aspects of Disaster Management. It will expose the students to the concept and functions of Disaster Management and to build competencies of Disaster Management professionals and development practitioners for effective supporting environment as put by the government in legislative manner. It would also provide basic knowledge, skills pertaining to Planning, Organizing and Decision-making process for Disaster Risk Reduction.

Course Objectives:

- To provide students an exposure to disasters, their significance, types & Comprehensive understanding on the concurrence of Disasters and its management.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention, risk reduction and the basic understanding of the research methodology for risk reduction measures.
- Equipped with knowledge, concepts, and principles, skills pertaining to Planning, Organizing, Decisionmaking and Problem solving methods for Disaster Management.
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

Unit I

5L

Introduction Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Learning Outcomes
After the completion of this unit, the student will be able to

- define the meaning, list the factors and mention the significance of disaster (L3).
- distinguish between hazard and disaster (L2).
- compare manmade and natural disaster (L4).
- list the types of disaster and describe their magnitude (L1).

Unit II

5L

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

Learning Outcomes:

After the completion of this unit, the student will be able to

- define the meaning, list the factors and mention the significance of disaster (L2).

- distinguish between hazard and disaster (L1).
- compare manmade and natural disaster (L3).
- list the types of disaster and describe their magnitude (L4).

Unit III

6L

Disaster Prone Areas in India Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics.

Learning Outcomes:

After the completion of this unit, the student will be able to

- describe the seismic zones and their characteristics (L1).
- identify the areas prone to floods and droughts (L3).
- distinguish between landslides and avalanches (L2).
- identify areas prone to cyclonic and costal hazards (L5).
- enumerate the post disaster diseases and epidemics (L3).

Unit IV

6L

Disaster Preparedness and Management Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, media reports: governmental and Community Preparedness.

Learning Outcomes:

After the completion of this unit, the student will be able to

- describe the monitoring of phenomena triggering a disaster/hazard (L1).
- evaluate the risk with the use of remote sensing and meteorological data (L5).
- list the governmental and community measures for disaster preparedness (L2).

Unit V

6L

Risk Assessment Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

Learning Outcomes:

After the completion of this unit, the student will be able to

- define and list the elements of disaster risk (L2).
- enumerate the measures for risk reduction (L3). □ apply the techniques of risk assessment (L1).
- identify the means of people's participation in risk assessment (L5).

Text Book(s):

1. R. Nishith, Singh A.K., Disaster Management in India: Perspectives, issues and strategies, New Royal Book Company., 2008.
2. Sahni, Pardeep, Disaster Mitigation Experiences and Reflections, Prentice Hall of India, New Delhi., 2012
3. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep and Deep Publication, 2007.

Course Outcomes:

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

- identify management activities in pre, during and post phases of disasters (L2).
- plan disaster management activities and specify measure for risk reduction (L1).
- apply risk assessment techniques in real life disaster scenarios (L4).

19EAC743: SANSKRIT FOR TECHNICAL KNOWLEDGE

L T P C
2 0 0 0

This course is intended to expose the student to the fundamentals of Sanskrit language and its technical utility in forming the core principles of many engineering branches. Students taking this course shall be able to relate the core principles of engineering branches to semantics of Sanskrit language

Course Objectives:

- to provide the knowledge of Sanskrit alphabets
- to expose the students to the basic grammar and sentence formation in past/present/future tenses
- to provide a classification of Sanskrit literature and its associated roots
- to demonstrate the relation of core engineering principles to the roots of Sanskrit literature

Unit I **9L**

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences.

Learning Outcomes:

After the completion of this unit, the student will be able to

- define and list the elements of disaster risk(L1).
- enumerate the measures for risk reduction(L2).
- apply the techniques of risk assessment(L4).

Unit II **9L**

Order, Introduction of roots, Technical information about Sanskrit Literature.

Learning Outcomes

After the completion of this unit, the student will be able to

classify the different branches of Sanskrit literature(L1).

- describe the order and roots of Sanskrit literature(L2).
- relate the applicability of Sanskrit literature to technical principles(L5).

Unit III **9L**

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Learning Outcomes

After the completion of this unit, the student will be able to

- relate the technical concepts of engineering to principles of electrical technology(L1).
- relate the technical concepts of engineering to principles of mechanical engineering(L4).
- apply the use of Sanskrit knowledge to describe the mathematical principles(L3).

Text Book(s):

1. Dr.Vishwas, Abhyaspustakam, Samskrita Bharti Publication, New Delhi, 2005.
2. Vempati Kutumb Shastri, Teach Yourself Sanskrit, Prathama Deeksha, Rashtriya Sanskrit Sansthanam, New Delhi Publication, 2003.
3. Suresh Soni, India's Glorious Scientific Tradition, Ocean books, New Delhi, 2011.

Course Outcomes:

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

- get a working knowledge in illustrious Sanskrit, the scientific language in the world (L2).
- get a Learning of Sanskrit to improve brain functioning (L1).
- develop the logic in mathematics, science & other subjects with principles of Sanskrit(L4).
- explore the huge knowledge from ancient literature with the help of Sanskrit (L5).

19EAC744: VALUE EDUCATION

L T P C
2 0 0 0

This course is intended to expose the student to the need for human values and methods to cultivate them for leading an ethical life with good moral conduct. Students taking this course will be able to experience a change in personal and professional behavior with these ethical principles guiding him throughout life

Course Objectives:

- To expose the student to need for values, ethics, self-development and standards
- To make the student understand the meaning of different values including duty, devotion, self-reliance etc.
- To imbibe the different behavioral competencies in students for leading an ethical and happy life
- To expose the student to different characteristic attributes and competencies for leading a successful, ethical and happy profession life.

Unit I

7L

Values and self-development –social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

Learning Outcomes:

After the completion of this unit, the student will be able to

- define the social values and individual attitudes for self-development (L2).
- describe the Indian vision of humanism (L1).
- distinguish between moral and non-moral acts (L3).
- list the standards and value principles for moral conduct (L5).

Unit II

7L

Importance of cultivation of values. Sense of duty. Devotion, self-reliance. Confidence, concentration. Truthfulness, cleanliness. Honesty, humanity. Power of faith, national unity. Patriotism, love for nature, discipline.

Learning Outcomes:

After the completion of this unit, the student will be able to describe the importance of cultivating values (L1).

- list the different traits of self-developed individual (L3).
- explain the need for loving nature/country/humanity (L2).

Unit III **7L**

Personality and Behaviour Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature.

Learning Outcomes:

After the completion of this unit, the student will be able to

- describe the benefits of positivie thinking, integrity and discipline (L2).
- list the different methods for avoiding fault finding, anger (L4).
- explain the methods to overcome suffering, religious intolerance, self-destructive habits (L3).

Unit IV **7L**

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

Learning Outcomes:

After the completion of this unit, the student will be able to

- describe the science of reincarnation (L2).
- explain the relation between self-management and good health (L1).
- elaborate the role of different religions in reaching the common goal (L4).
- list the different techniques for mind-control to improve personality and studies (L3).

Text Book(s):

1. Chakroborty S.K., “Values and ethics for organizations: Theory and Practice”, Oxford University Press, 1998.

Course Outcomes:

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

- appreciate the need for human values and methods for self-development (L2).
- elaborate the different traits and benefits of a self-developed individual (L1).
- list the different attributes of self-developed individual (L4).
- elaborate the role and scope of books/faith/health/religions in character building and competence development (L3).

19EAC745: CONSTITUTION OF INDIA

L T P C
2 0 0 0

This course is intended to expose the student to the philosophy of Indian constitution. Students will be able to understand their fundamental rights/duties and governance structure. Students also appreciate the role of election commission in establishing a democratic society.

Course Objectives:

- To familiarize the student about the need for a constitution
- To make the student understand the role of constitution in a democratic society
- To acquaint the student with key constitutional features and fundamental rights of a citizen
- To impart the organs of governance and local administration hierarchy and their responsibilities
- To familiarize the student with the role, responsibilities and administration hierarchy of election commission

Unit I

5L History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working). **Philosophy of the Indian Constitution**: Preamble, Salient Features

Learning Outcomes:

After the completion of this unit, the student will be able to

- list the outline of drafting committee and their roles in the making of Indian constitution (L1)
- describe the need and role of a constitution in a democratic society (L1)
- elaborate the salient features of Indian constitution (L2)

Unit II

5L Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

Learning Outcomes:

After the completion of this unit, the student will be able to

- list the fundamental rights of a citizen (L2)
- explain the intricacies in the different rights (L3)
- elaborate the fundamental duties of a citizen (L3)
- describe the principles of state policy (L4)

Unit III **6L**

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Learning Outcomes:

After the completion of this unit, the student will be able to

- present the hierarchy of governance (L3)
- list the role/responsibilities/powers of different organs of governance (L4)
- elaborate the guidelines for appointment/transfer of judges (L5)

Unit IV **6L**

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Learning Outcomes:
After the completion of this unit, the student will be able to
- describe the administrative organizational hierarchy of municipalities and panchayats(L4)
- appreciate the role/responsibilities/powers of mayor, CEO, elected officials (L5)
- appreciate the importance of grass root democracy (l5)

Unit V **6L**

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Learning Outcomes:
After the completion of this unit, the student will be able to
- describe the administrative hierarchy of election commission (L5)
- elaborate the roles/responsibilities/powers of election commissioners at different levels of hierarchy (L5)
- outline the welfare activities of SC/ST/OBC/Women by different bodies (L4 & L5)

Text Book(s):
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. S. N. Busi, Dr. B. R. Ambedkar, Framing of Indian Constitution, 1/e, 2015.
3. M. P. Jain, Indian Constitution Law, 7/e, Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes:

After successful completion of the course, the student will be able to
- describe the philosophy and salient features of Indian constitution (L1)
- list the constitutional rights and duties of a citizen (L3)
- elaborate the central and local administrative hierarchy and their roles (L2)
- describe the roles/responsibilities/powers of different governing and administrative bodies (L4)
- explain the structure/functioning and power of election commission (L5)

19EAC746: PEDAGOGY STUDIES

L T P C
2 0 0 0

This course is aimed to familiarizing the student with pedagogical principles, practices and methodologies. This course is intended for students interested in pursuing a career in teaching and research.

Course Objectives:

- To familiarize the student about the need for pedagogy studies, background and conceptual framework
- To expose the student to pedagogical practices in formal/informal classrooms
- To acquaint the student with type of curriculum and guidance materials for effective pedagogy
- To familiarize the student with classroom practices and curriculum assessment procedures
- To make the student understand the effect of undertaking research on teaching quality

Unit I **5L**

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

Learning Outcomes:

After the completion of this unit, the student will
be able to define the aim and rationale behind teacher education (L2).

- classify the different theories of learning (L1).
- elaborate the need and role of curriculum, teacher education (L3).

Unit II **5L**

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Learning Outcomes:

After the completion of this unit, the student will be able to

- describe the different pedagogical practices used by teachers in formal and informal classrooms(L2).
- explain the pedagogical practices employed in developing countries (L1).
- enumerate the duties of faculty in terms of teaching, research, consultancy, administration (L4).

Unit III **6L**

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change.

Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Learning Outcomes:

After the completion of this unit, the student will be able to list the measures for effective pedagogy (L1).

- identify the different documentation required to formalize curriculum implementation and quality assessment (L3).
- describe the teachers attitudes and beliefs in pedagogic strategies (L4).

Unit IV **6L**

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes.

Learning Outcomes:

After the completion of this unit, the student will be able to

- define the organizational hierarchy in a school administration system (L3).
- list the different barriers to learning (L1).
- enumerate the methods to overcome limited resources and handle large class sizes (L4).
- describe the follow-up support and peer-support in classroom practices (L2).

Unit V **6L**

Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Learning Outcomes:

After the completion of this unit, the student will be able to

- explain the need for and role of research in teaching profession (L1).
- list the different research activities to be taken up by teachers (L2).
- describe the impact of research on teaching quality and learning process (L4).

Text Book(s):

1. Ackers J, Hardman F, Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261, 2001 2. Agrawal M, Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379, 2004.
3. Akyeampong K, Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID., 2003.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J, Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282., 2013.
5. Alexander RJ, Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell., 2001.
6. Chavan M, Read India: A mass scale, rapid, 'Learning to Read' campaign., 2003.

Course Outcomes:

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

- describe the theories of learning and conceptual framework of pedagogy (L2).
- explain the pedagogical practices used by teachers in formal and informal classrooms (L1).
- visualize the administrative hierarchy of schools and colleges and define the role (L4).
- appreciate the need for research and define the future direction of teaching career (L3).
- describe the impact of curriculum and assessment on the teaching learning process of a student (L5).

19EAC747: STRESS MANAGEMENT BY YOGA

L	T	P	C
2	0	0	0

This course is aimed to familiarize the student with basic principles of yoga and different physical/mental practices for managing mind and body. This course helps the student in managing stress during education, home and workplace. Further, principles learnt in this course help in building overall personality for a stress-free, happy and independent life.

Course Objectives:

- To familiarize the student about eight parts of yoga and their significance To expose the student to the importance and meaning of Yam and Niyam
- To make the student understand the meaning and importance of yogic principles including Ahimsa, Satya, Astheya etc
- To introduce the different yogic poses with a knowledge of their benefits for mind and body
- To familiarize the effect of different types of breathing techniques in concept and in activity

Unit I **9L**

Definitions of Eight parts of yoga (Ashtanga).

Learning Outcomes:

After the completion of this unit, the student will be able to
list the eight parts of yoga(L2).
- describe the effects of different parts of yoga on mind and body(L1).
- elaborate the importance of yoga in stress management and personality development(L3).

Unit II **9L**

Yam and Niyam.
Do`s and Don't's in life.
i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

Learning Outcomes:

After the completion of this unit, the student will be able to
elaborate the importance of Yam and Niyam (L2).
- describe the meaning and significance of Ahinsa, satya, astheya etc (L1).
- explain the need for shaucha, santosh, tapa, swadhyay in leading a healthy and fruitful life (L3).

Unit III **9L**

Asan and Pranayam
i) Various yog poses and their benefits for mind & body ii) Regularization of breathing techniques and its Effects-Types of pranayam.

Learning Outcomes:

After the completion of this unit, the student will be able to

1. demonstrate the different physical asanas and explain their physical and phychological effects(L1).
2. demonstrate the different breathing techniques and describe their physical and mental effects (L3).
3. distinguish between different types of pranayamam(L4).

Text Books

1. Janardan, Yogic Asanas for Group Tarining-Part-I, Swami Yogabhyasi Mandal, Nagpur
2. Swami Vivekananda, "Rajayoga or conquering the Internal Nature", Advaita Ashrama, Kolkata

Course Outcomes:

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

describe the eight parts of yoga and their significance (L1).

- explain the the importance and meaning of Yam and Niyam (L3).
- define the meaning and importance of yogic principles including Ahimsa, Satya, Astheya etc (L2).
- demonstrate the different yogic poses and explain their benefits for mind and body (L4).
- demonstrate the different types of breathing techniques and explain their physical and mental benefits (L5).

19EAC748: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

L T P C
2 0 0 0

This course is aimed to familiarize the student with life enlightenment skills for personality development. This course helps the student in building his holistic personality through human values, ethics and spiritual attributes.

Course Objectives:

- To familiarize the student to good personality traits through moral stories
- To make the student understand the goal of human life and importance of good personality in reaching the goal
- To expose the student to the study of Shrimad-Bhagwad-Geeta for developing his/her personality and achieve the highest goal in life
- To familiarize the student to leadership skills for driving nation and mankind to peace and prosperity
- To expose the role of Neetishatakam for developing versatile personality of students.

Unit I **9L**

Neetisatakam-Holistic development of personality
Verses- 19,20,21,22 (wisdom)
Verses- 29,31,32 (pride & heroism)
Verses- 26,28,63,65 (virtue)
Verses- 52,53,59 (dont's)
Verses- 71,73,75,78 (do's).

Learning Outcomes:
After the completion of this unit, the student will be able to

- describe the moral stories illustrating the traits of good personality (L1)
- define the meaning and importance of wisdom, pride, heroism, virtue etc (L2)
- identify do and donts in life from the foundations of human morals/ethics (L2)

Unit II **9L**

Approach to day to day work and duties.
Shrimad BhagwadGeeta: Chapter 2-Verses 41, 47,48,
Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.

Learning Outcomes:
After the completion of this unit, the student will be able to

- describe the characteristics and principles of bhakti yogam, jnana yogam and karma yogam (L3)

- identify the use of different yogic characteristics in different activities of daily life/duties (L4)
- apply the use of yogic principles for leading a stress-free, happy and fruitful life with good developed personality (L4)

Unit III **9L**

Statements of basic knowledge.
Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68
Chapter 12 -Verses 13, 14, 15, 16,17, 18
Personality of Role model. Shrimad BhagwadGeeta:
Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
Chapter 4-Verses 18, 38,39
Chapter18 – Verses 37,38,63

Learning Outcomes:

After the completion of this unit, the student will be able to

1. list the characteristics of role model proposed by verses of bhagavad gita (L3)
2. explain the methods for obtaining life enlightenment through the practice of four yoga appropriately (L4)
3. describe the characteristics of karma yogi/jnana yogi for developing leadership personality (L5)

Text Book(s):

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

Course Outcomes:

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

- List the different parables of neethisathakam and identify their morals (L1)
- enumerate the different traits of human personality for life enlightenment (L2)
- describe the leadership attributes for driving nation and mankind to peace and prosperity (L3)
- explain the applicability of different types of yoga to day-to-day work and duties resulting in responsible personality (L4)

19EAC750: DEVELOPING SOFT SKILLS AND PERSONALITY

L	T	P	C
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Soft skills comprise pleasant and appealing personality traits as self-confidence, positive attitude, emotional intelligence, social grace, flexibility, friendliness and effective communication skills. The course aims to cause a basic awareness within the students about the significance of soft skills in professional and inter-personal communications and facilitate an all-round development of personality.

Course Objectives

- To familiarize the student to the criteria for self-assessment and significance of selfdiscipline.
- To expose the student to attitudes, mindsets, values and beliefs.
- To acquaint the student to plan career and goals through constructive thinking.
- To enable the student to overcome barriers for active listening and persuasive speaking.
- To familiarize the skill of conducting meetings, writing minutes and involving in active group discussions.

Unit I **8L**

Self-Assessment; Identifying Strength & Limitations; Habits, Will-Power and Drives; Developing Self-Esteem and Building Self-Confidence, Significance of Self-Discipline

Learning Outcomes

After the completion of this unit, the student will be able to

- identify strengths & limitations through self-assessment(L3)
- list the attributes of personalities will good will-power and self-drives(L1)
- describe the reasons for building self-esteem and self-confidence(L2)
- explain the significance of self-discipline(L2)

Unit II **8L**

Understanding Perceptions, Attitudes, and Personality Types: Mind-Set: Growth and Fixed; Values and Beliefs

Learning Outcomes

After the completion of this unit, the student will be able to

- define the characteristics of different perceptions, attitudes and personality types(L1)
- distinguish between fixed and growing mindsets(L3)
- define the importance and meaning of values and beliefs(L2)

Unit III **8L**

Motivation and Achieving Excellence; Self-Actualisation Need; Goal Setting, Life and Career Planning; Constructive Thinking

Learning Outcomes

After the completion of this unit, the student will be able to

- describe the need for having high motivation and achieving excellence(L2)
- define the need for self-actualization(L1)
- plan the life and career goals based on self assessment(L4)

- explain the attributes of constructive thinking(L2)

Unit IV **8L**

Communicating Clearly: Understanding and Overcoming barriers; Active Listening; Persuasive Speaking and Presentation Skills.

Learning Outcomes

After the completion of this unit, the student will be able to

- self-assess the barriers for communicating clearly (L4)
- list the attributes of active listening(L1)
- describe the minimal aspects of effective presentation(L2)
- organize ideas resulting a persuasive talk(L3)

Unit V **8L**

Conducting Meetings, Writing Minutes, Sending Memos and Notices; Netiquette: Effective Email Communication; Telephone Etiquette; Body Language in Group Discussion and Interview.

Learning Outcomes

After the completion of this unit, the student will be able to

- describe the format and structure of writing meeting minutes(L2)
- identify the essential components of memos and notices(L3)
- explain the principles of effective email communication(L2)
- list the basic etiquette of telephone conversation(L1)
- describe the effective body traits during group discussion and interviews(L2)

Text Books

1. Dorch, Patricia. What Are Soft Skills? New York: Execu Dress Publisher, 2013.
2. Kamin, Maxine. Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers, Teams, and Leaders. Washington, DC: Pfeiffer & Company, 2013.
3. Klaus, Peggy, Jane Rohman& Molly Hamaker. The Hard Truth about Soft Skills. London: HarperCollins E-books, 2007.
4. Petes S. J., Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw-Hill Education, 2011.
5. Stein, Steven J. & Howard E. Book. The EQ Edge: Emotional Intelligence and Your Success. Canada: Wiley & Sons, 2006.

Course Outcomes

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

- carry out self-assessment and describe the significance of self-discipline(L4)
- define, classify and compare attitudes, mindsets, values and beliefs(L3)
- plan career and goals through constructive thinking and personal assessment(L4)
- overcome barriers for active listening and persuasive speaking (L5)
- conduct meetings, write minutes and involve in active group discussions(L3)

19EOE742: BUSINESS ANALYTICS

L T P C
3 0 0 3

This course introduces students to the science of business analytics. The goal is to provide students with the foundation needed to apply data analytics to real-world challenges they confront daily in their professional lives. Students will learn to identify the ideal analytic tool for their specific needs; understand valid and reliable ways to collect, analyze, and visualize data; and utilize data in decision making for managing agencies, organizations or clients in their workspace

Course Objectives:

- To familiarize the scope, process and advantages of business analytics
- To acquaint the student with the modeling and problem solving skills in business analytics
- To impart the organization and management of business analytics
- To introduce the forecasting models and techniques used in analytics
- To expose the formulation and decision strategies used in business analytics

Unit I **8L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- define the scope and process of business analytics (L1).
- choose an organizational structure to implement a business analytics process (L4).
- describe the statistical tools and methods used for data modeling and analysis (L2).
- identify the sampling and estimation requirements for data analysis (L1).

Unit II **8L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- identify the relationships and trends in data (L1).
- utilize linear regression methods for identifying data relationships (L4).
- list the types of data and their models used for business analytics (L1). describe the methods for visualization and exploration of data (L2).

Unit III **8L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- describe the management issues in the organization structures (L2).
- define the designing information policy and its usage (L1).
- list the methods for ensuring data quality measuring contribution (L1).
- explain the use of data mining methodologies for predictive analytics analysis (L3).
- describe the use of prescriptive analytics methods in business analytics process (L2).

Unit IV **10L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- classify and describe the use of forecasting models (L3).
- model the use of regression forecasting with casual variables (L5).
- identify the appropriate forecasting model for a given data (L5).
- explain the use of monte carlo simulation for forecasting and identify the involved risk (L2).

Unit V **8L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- formulate decision problems (L2).
- list the decision strategies with and without probabilities (L1).
- use the decision trees for analysis (L4).
- describe the value of information, utility and its use in decision making (L4).

Textbook(s):

1. Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Business analytics Principles, Concepts, and Applications Pearson FT Press, 2014.
2. James Evans, Business Analytics, Pearson Education, 2013.

Course Outcomes:

Upon successful completion of the course, the student will be able to

- define the scope, process and advantages of business analytics (L1).
- explain the modeling and problem solving skills in business analytics (L2).
- describe the organization and management of business analytics (L3).
- utilize the forecasting models and techniques used in analytics (L4).
- enumerate and utilize the formulation and decision strategies (L2).

19EOE746: OPERATIONS RESEARCH

L T P C
3 0 0 3

Optimization problems arise in all walks of human activity- particularly in engineering, business, finance and economics. The simplest optimization problems are linear in nature which may be subject to a set of linear constraints. This course will equip the student with the expertise to mathematically model real life optimization problems as Linear Programming (Optimization) Problems and subsequently educate the student to solve these models with the help of the available methods.

Course Objectives:

- To impart knowledge on developing mathematical formulation for linear programming and transportation problem
- To familiarize the student in the construction of the required activities in an efficient manner to complete it on or before a specified time limit and at the minimum cost.
- To expose the development of mathematical model for interactive decision-making situations, where two or more competitors are involved under conditions of conflict and competition.
- To illustrate PERT and CPM techniques for planning and implementing projects.
- To impart the knowledge of formulating and analysis of real life problems using advanced tools and techniques for resource optimization
- To provide frameworks for analyzing waiting lines using advanced queuing theory concepts

Unit I **8L**

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

Learning Outcomes:

After completing this unit, the student will be able to

- identify and develop operational research models from the verbal description of the real system (L4).
- understand the classification systems of effective Inventory control models (L2).

Unit II **8L**

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

Learning Outcomes:

After completing this unit, the student will be able to

- translate a real-world problem, given in words, into a mathematical formulation (L2)
- utilize the mathematical tools that are needed to solve optimization problems (L2)

Unit III **8L**

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

Learning Outcomes:

After completing this unit, the student will be able to

- describe the need and origin of the optimization methods (L2).
- classify optimization problems to suitably choose the method needed to solve the particular type of problem (L3).

Unit IV **8L**

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

Learning Outcomes:

After completing this unit, the student will be able to

- choose linear programming problems to suitably choose the method needed to solve the particular type of problem (L1).
- identify industrial problems involved in inventory, MRP and scheduling (L2).

Unit V **8L**

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

Learning Outcomes:

After completing this unit, the student will be able to

- identify the values, objectives, attributes, decisions, uncertainties, consequences, and tradeoffs in a real decision problem (L2).
- apply the models to incorporate rational decision-making process in real life situations (L3).
- analyze various modeling alternatives & select appropriate modeling techniques for a given situation (L3).

Text Book(s):

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

Course Outcomes:

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

- Understand the basic concepts of different advanced models of operations research and their applications (L2).
- Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action (L4).
- Apply the models to incorporate rational decision-making process in real life situations (L4).

- Analyze various modeling alternatives & select appropriate modeling techniques for a given situation (L3).
- Validate output from model to check feasibility of implementations (L5).
- Create innovative modeling frameworks for a given situation (L6).
- Conduct and interpret post-optimal and sensitivity analysis and explain the primal-dual relationship (L3).

19EOE748: COST MANAGEMENT OF ENGINEERING PROJECTS

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This course will equip the student with the expertise to mathematically model engineering projects and use effective methods and techniques to plan and execute engineering activities.

Course Objectives:

- To introduce the basic principles of strategic cost management and the related terminology
- To familiarize the project planning and execution process involving technical/nontechnical activities
- To acquaint the student with detailed engineering activities and their cost management analysis
- To impart the knowledge of cost analysis and profit planning of engineering projects
- To familiarize the quantitative techniques for optimization of budget allocation

Unit I **8L**

Introduction and Overview of the Strategic Cost Management Process, Cost concepts in decisionmaking; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Learning Outcomes:

After the completion of this unit, the student will be able to

- describe the cost concepts in decision making (L2).
- define the various costs involved in the cost management process (L2).
- list the objectives of cost control (L2).
- identify the different fields of a database for operational control (L2).

Unit II **8L**

Project: meaning, Different types, why to manage, cost overruns centers, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities.

Learning Outcomes:

After the completion of this unit, the student will be able to

- define the meaning of a project and list the different types (L2).
- identify the measures to manage cost overruns (L2).
- describe the various stages of project execution from conception to commissioning (L2).
- plan the proper order of technical/nontechnical activities as part of project execution (L2).

Unit III **8L**

Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

Learning Outcomes:
After the completion of this unit, the student will be able to
- identify the different clearance norms required in the pre-project execution phase (L2).
- describe the hierarchy of project team and identify the role of each member (L2).
- list the different contents of project contracts (L2).
- present the project cost control and planning through bar charts, network diagrams etc (L2).

Unit IV **8L**

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decisionmaking problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and ValueChain Analysis.

Learning Outcomes:
After the completion of this unit, the student will be able to
- describe the cost behavior and profit planning (L2).
- distinguish between marginal costing and absorption costing (L2).
- analyze the variance of standard costing (L2).
- analyze the pricing strategies in project costing (L2).
- identify the quality measures satisfying the appropriate constraints (L2).

Unit V **10L**

Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing. Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory

Learning Outcomes:
After the completion of this unit, the student will be able to
- define and compare the different budgeting strategies (L2).
- model the cost management as a linear programming problem (L2).
- measure the divisional profitability and decide the appropriate pricing (L2).

Textbook(s):
1. Charles T. Horngren, Srikant M. Datar, George Foster, Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi, 2006.

References:
1. Charles T. Horngren, George Foster, Advanced Management Accounting, Greenwood Publishing, 2001.
2. Robert S Kaplan, Anthony A. Alkinson, Management & Cost Accounting, 1998.
3. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting, Wheeler Publisher, 2004.
4. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book, 2006.

Course Outcomes:

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

- list the basic principles of strategic cost management and define the related terminology (L1).
- plan the project execution process involving technical/nontechnical activities (L4).
- describe the detailed engineering activities and their cost management analysis (L2).
- carry out the cost analysis and profit planning of engineering projects (L5).
- utilize quantitative techniques for optimization of budget allocation (L5).

19EOE752: WASTE TO ENERGY

L T P C
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This course introduces the basic principles and different technologies of converting waste to energy. Student will be able to appropriately identify the methods and build biomass gasification systems of different capacities depending on application requirements.

Course Objectives:

- to introduce the classification of waste for its usefulness in preparing different fuels
- to familiarize the biomass pyrolysis process and its yield issues
- to acquaint the student with biomass gasification processes and construction arrangements
- to impart the types and principles of biomass combustors
- to familiarize the calorific values and composition of biogas resources

Unit I **8L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- distinguish between different types of waste (L1).
- classify the different types of waste for manufacturing different types of fuel (L3). identify the different conversion devices and their applications (L4).

Unit II **8L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- classify the different types of pyrolysis methods based on speed (L1).
- describe the different methods of manufacturing charcoal (L2).
- explain the chemical processes involved in the manufacture of pyrolytic oils and gases (L2).

Unit III **8L**

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

Learning Outcomes

After the completion of this unit, the student will be able to

- explain the design, construction and operation of different gasifiers (L2).
- describe the burner arrangement for thermal heating (L2).
- elaborate the gasifier engine arrangement for equilibrium and kinetic considerations (L3).

Unit IV **8L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- explain the basic principle of biomass combustors (L2).
- classify different combustors based on their capacity and efficiency (L3).
- describe the construction and operation of fixed bed inclined grate, fluidized bed combustors (L2).

Unit V **10L**

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

Learning Outcomes:

After the completion of this unit, the student will be able to

- list the properties of biogas (L1).
- elaborate the design, construction and operation of biogas plant (L2).
- classify the different biomass resources and their conversion process (L3).
- distinguish between different biogas plants and identify their applications (L5).

Text Book(s)

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

Course Outcomes:

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

- classify different types of waste for their usefulness in preparing different fuels (L3).
- describe the biomass pyrolysis process and its yield issues (L2).
- outline the different biomass gasification processes and their construction arrangements (L3).
- explain the types and principles of biomass combustors (L2).
- analyze the calorific values and composition of biogas resources (L5).

19EOE758 – C BASED VLSI DESIGN

L T P C
3 0 0 3

Module I **8 Hours**

Introduction: Levels of abstraction – Synthesis – Languages, Design and Technologies – Essential issues in synthesis – Status and future of high-level synthesis. **Architectural Models in Synthesis:** Design styles and target architectures – Combinational logic – Finite state machines – System architecture – Engineering considerations. **Quality Measures**: Relationship between structural and physical designs – Area measures – Performance measures – Other measures.

Module II **8 Hours**

Design Description Languages: Introduction to HDLs – Language models vs architectural styles – Programming language features for HDLs – Hardware-specific HDL features – HDL formats – Modeling guidelines for HDLs. **Design Representation and Transformations**: Design flow in high-level synthesis: An example – HDL compilation – Representation of HDL behavior – Representation of HLS outputs – Transformations.

Module III **8 Hours**

Partitioning: Introduction – Basic partitioning methods – Partitioning in high-level synthesis. **Scheduling**: Problem definition – Basic scheduling algorithms – Scheduling with relaxed assumptions – Other scheduling formulations.

Module IV **8 Hours**

Allocation: Problem definition – Datapath architectures – Allocation tasks – Greedy constructive approaches – Decomposition approaches – Iterative refinement approach. **Design Methodology for High-Level Synthesis:** Basic concepts – Generic synthesis system – System synthesis – Chip synthesis – Logic and sequential synthesis – Physical-design methodology – System database – Component database – Conceptualization environment.

Module V **8 Hours**

System Implementation: Overview of Hercules and Hebe systems. **Experimental Results**: Design experiences: Ethernet co-processor, Digital audio I/O chip, Raster line design, Error correcting codes, Greatest common divisor – Synthesis of benchmark examples.

Text Books:

1. Daniel D Gajski, Nikil D Dutt, Allen C-H Wu and Steve Y-L Lin, "High-Level Synthesis: Introduction to Chip and System Design", Springer Science + Business Media New York, 1st Edition, 1992.
2. David C Ku and Giovanni De Micheli, "High Level Synthesis of ASICs under timing and synchronization constraints", Springer Science + Business Media New York, 1st Edition, 1992.

Reference Books

1. Giovanni De Micheli, "Synthesis and Optimization of Digital Circuits", McGraw Hill, India Edition, 2003.
2. Mike Fingeroff, "High Level Synthesis Blue Book", Mentor Graphics Corporation, 2010.
3. Philippe Coussy and Adam Moraweic, "High-Level Synthesis: From Algorithm to Digital Circuits", Springer, 2008.

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

CO 1 To understand the different levels of abstraction and architectural models
CO 2 To analyze the various representation of hardware description language
CO 3 To interrupt the types of partitioning and scheduling algorithms
CO 4 To analyze the methodologies for resource allocation and synthesis
CO 5 To implement the Hercules/ Hebe systems and benchmarking circuits

19EOE756: WIND ENERGY

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This course gives an overview of key aspects in wind energy engineering. This course covers the most fundamental disciplines of wind energy research such as wind measurements and resource assessment, aerodynamics, wind turbine technology, structural mechanics, materials, financial and electrical systems

Course Objectives:

- To explain the need of wind energy and sitting challenges(L2)
- To find out how the wind power density and the power production can be modeled for an area based on different terrain properties. (L3)
- To learn about financial aspects during the entire lifetime of a wind turbine.(L2)
- To outline the fundamental principle of a wind turbine (L2)
- To discover the forces, act on a wind turbine blade. (L4)

Unit I: **3L**

Introduction to wind energy: pre-requisites, grading policy, math pre-requisites, the need for wind energy, sitting challenges and stakeholder involvement

Learning Outcomes

After completion of this unit the student will be able to

- Recall the theoretical knowledge necessary to complete the course (L1)
- Categorize some of the issues that get addressed in an EIA (L4)
- Recall several types of stakeholders (L1)
- Recognize the two phases of the planning process for a wind farm project (L1)
- Choose the most important environmental issues (L3)

Unit II: **8L**

Wind Resources: wind profiles, wind resource assessment, wind profiles and wind resources, brief introduction with focus on wind energy, wind scanner-remote sensing of wind, wind data analysis

Learning Outcomes:

After completion of this unit, the student will be able to

- Simplify the principle of wind resource assessment (L4)
- Estimate the relevance for wind energy(L5)
- Recognize different remote sensing techniques used for wind energy(L1)
- Express the principle of Doppler shift used in wind lidar (l2)
- Recall the characteristics of a scanning lidar (L1)

Unit III: **8L**

Economy: the cost of wind farms, energy production and revenue, tools for wind energy economics, economics of wind energy – Net Present Value(NPV) , economics of wind energy – Levellised Cost of Energy(LCoE), wind energy technology concepts, wind turbine terminology and components, wind energy technology concepts

Learning Outcomes:

After completion of this unit, the student will be able to

- Appraise simple calculations of a very approximate energy production figure (L5)
- Argue about the importance of revenue in the economics of a wind farm (L4)
- Express the mechanisms of different concepts in energy extraction (L2)
- Appraise the power output for the different concepts (L5)
- Recall the main components of the commercial horizontal-axis wind turbine (L1)
- Recall the main degrees of freedom of the commercial horizontal-axis wind turbine (L1)

Unit IV: 10L

Aerodynamic: power, thrust and optimum rotos, Flow and forces around the wind turbine blade, aerodynamics -1D momentum theory, aerodynamics – rotational theory and velocity triangle , fatigue and mechanical properties of metals, material requirements for wind turbine blades, composite materials for wind turbine blades, stresses in the blade cross section, the weight of a wind turbine blade

Learning Outcomes:

After completion of this unit, the student will be able to

- Recognize how the aerodynamic forces drives the rotor around (L1)
- Appraise the lift on a blade section from an air foil curve (L5)
- Express the use of uniaxial composites in wind turbine blades (L2)
- Estimate the fatigue limit of a composite (L5)
- Express basic mechanical and fatigue properties of metals (L2)
- Appraise the loads and stresses working on a wind turbine blade (L5)

Unit V: 7L

Structural mechanics: structural design of wind turbine blades, beam theory, grid connection of wind power, control of wind turbines and wind power plants, integration of variable wind power generation, wind turbine rotor speed control strategy

Learning Outcomes:

After completion of this unit the student will be able to

- Estimate boundary conditions and loads on beams (L5)
- Simplify the basic principles in structural design (L4)
- Simplify maximum power point tracking (L4)
- Express the control architecture in wind power plants (L2)
- Recognize the four main electrical design concepts for wind turbines (L1)
- Express the electrical layout of a wind power plant (L2)
- Recognize the role of electricity markets, balancing and reserves (L1)

Course Outcomes:

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

- identify the need of wind energy (L1)
- apply basic engineering models for wind speed and determine the annual energy production for a wind turbine. (L3)
- perform simple calculations for assessing wind farm projects and for calculating the cost of energy from wind (L3)
- carry out calculations of thrust and power for a wind turbine (L3)
- define boundary conditions and loads on beams and calculate reactions and internal forces. (L1)

19EOE762 - WEB TECHNOLOGIES

L T P C 3 0 0 3

Module I **8hours**

Introduction to HTML Version5: Basic syntax, HTML document structure, text formatting, images, lists, links, tables, forms, frames, section, article, range and date. **Cascading Style Sheets Version3**: Levels of style sheets, style specification formats, selector forms, font properties, list properties, color properties, alignment of text, background images, span and div tags.

Module II **10 hours**

Introduction to Java Script: Overview of java script, syntactic characteristics, primitives, operator and expression, control statements, arrays, functions, errors in scripts, Document Object Model(DOM), event driven computation, element access in java script, the navigator object. **Dynamic Document with Java Script** : Element positioning, moving elements, changing colors and fonts, dynamic content, locating the mouse cursor, slow movements of elements, dragging and dropping elements.

Module III **8hours**

Introduction to XML: Syntax of XML, document structure, and document type definition, namespaces, XML schemas, document object model, presenting XML using CSS. **Introduction to other XML Technologies**: XLink, XPointer, XQuery and XPath, XQuery and XSLT, XQuery processor and FLWOR expression.

Module IV **8 hours**

Introduction to Servlets: Lifecycle of a servelet, the servlet api, the javax.servelet package, the javax.servlet.http package, handling http request & responses, using cookies, session tracking and security issues and servlets with database connectivity. **Introduction to Model View Controller (MVC):** Architecture, its structure, components.

Module V **8 hours**

Introduction to JSP: The problem with servlet, the anatomy of a JSP page, JSP processing, JSP applications, JSP components, comments, expressions, scriplets, JSTL tag library, JSP database connectivity. **Introduction to Web Servers**: Installing the Java software development kit, tomcat server & testing tomcat, structure of web application, deploying web application, IIS web server, and GWS web server.

Text Book(s)

1. Robert W.Sebesta, Programming the World Wide Web, 4/e, Pearson, 2007.
2. Chris Bates, Web Technologies, 2/e, Wiley, 2002.
3. Jason Hunter, William Crawford, Java Servlet Programming, 2/e, O'Reilly, 2003.

References

1. Dietel and Nieto, Internet and World Wide Web – How to program, PHI/Pearson Education , 2006.
2. Herbert Schildt, JAVA The Complete References, 8/e, McGraw Hill, 2014
3. UttamK.Roy, Web Technologies, Oxford Higher Education publication, 2004.
4. BaiEkedaw, Web Warrior Guide to Web Programmming, Thompson Publications, 2012.

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