SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF EEE
DIGITAL COMMUNICATION
TEACHING SCHEME & SYLLABUS

MASTER OF TECHNOLOGY
(Batch 2021-23)

JULY-2021

POORNIMA UNIVERSITY

Your Dreams Our Goal

VISION

To create knowledge based society with scientific temper, team spirit and dignity of labor to face global competitive challenges.

Mission

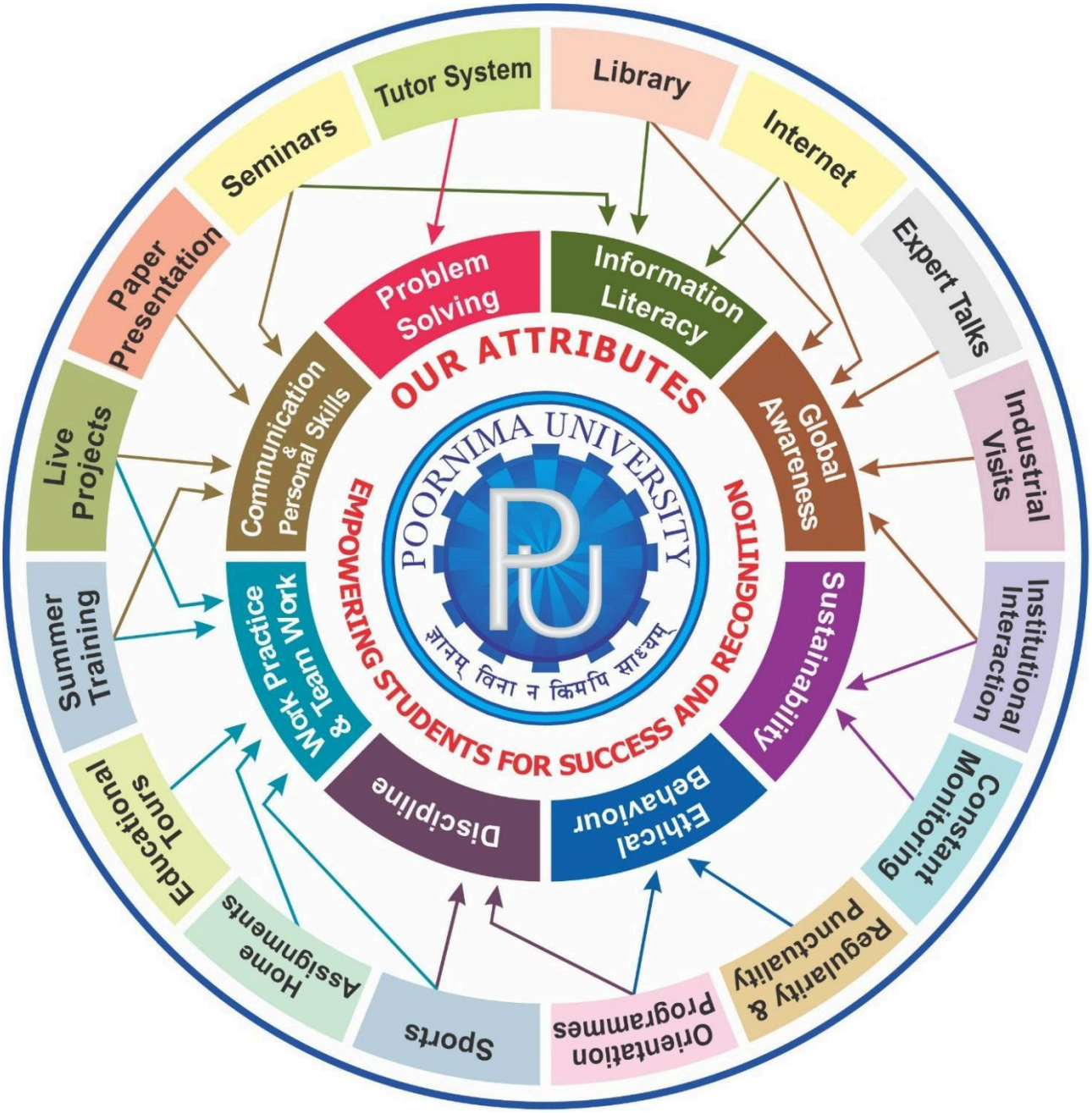
To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professionals with dedication and commitment to excellence in all spheres of life.

Quality Policy

To provide Quality Education through Faculty development, updating of facilities and continual improvement meeting University norms and keeping stake holders satisfied.

Knowledge Wheel

At Poornima, the academic atmosphere is a rare blend of modern technical as well as soft skills and traditional systems of learning processes.



REVISED SYLLABUS OF MASTER OF TECHNOLOGY (B.Tech)

Title of the Programme

1. Master of Technology (M.Tech)

Nature of the Programme

(i) M. Tech is two year (full-time programme).

Preamble

3. The revised curriculum for M.Tech is developed keeping in mind the national priorities and international practices. It also attempts to align the programme structure and course contents with student aspirations & recruiter expectations. This syllabus also attempts to align with National Goal of "***Make in India", "Start – Up and Stand – Up India" and "Digital India".***

Need for Revision of the Curriculum

4. There was a need for revision of the curriculum in view of the dynamism in the industry practices, evolution in technology and the evolving expectations of key stakeholders viz. students, the industry and faculty members at large. It also has relevance due to changed technological, social, cultural and economic environment of the nation.

5. Specifically, the triggers for the comprehensive revamp of the curriculum are

(a) New Skills & Competencies desired due to dynamic technology environment: Jobs of today were perhaps not created about 5 years ago. This aspect has a direct linkage with contents and structure of syllabus across the Knowledge, Skills and Attitude (KSA) dimensions, which calls for frequent and meaningful updating of the curriculum.

(b) Concerns expressed by the Industry: The industry has expressed concerns about the need for improvement in the communication skills, inter-personal skills, domain knowledge basics, business environment awareness, technology proficiency, and attitude of the M.Tech graduates. Newer and innovative evaluation methods are necessary to address these concerns of the industry.

(c) Application Orientation: There is a pressing need to imbibe application oriented thinking, based on sound knowledge of Technical field, principles and concepts. Technical education needs to move out of the classrooms and instead focus on group activity, field

work, experiential learning, etc. This can be achieved only through a radical change in the evaluation pattern and course delivery methodology.

(d) Changing mind-set of the Learner: The profile of the students for the M. Tech programme, their learning styles and the outlook towards higher education has undergone a gradual transformation. The expectations of the students from the M. Tech programme have changed over the last decade.

(e) Integrate a basket of skill sets: SET-Schools are expected to imbibe varied aspects of 'learning beyond the syllabus through innovative curriculum design, contemporary syllabus, effective delivery and comprehensive evaluation.

(f) Entrepreneurial aspirations and preparedness for the same: The youth now aspires to become masters of their own and wish to start up their new ventures. These will create further growth opportunities.

6. Specifically, the following skill sets are in focus:-

(a) Reading & Listening Skills

(b) Problem Definition& Problem Solving Skills

(c) Application of Technology Tools

(d) Mastery of Analytics (Quantitative Aspects)

(e) Sensitization to Cross-Functional skills

(f) Sensitization to Cross-Cultural skills

(g) Sensitization to Global perspectives

(h) Peer-based Learning - Working in groups

(i) Learning by application and doing – Experiential learning

(j) Team building basics and its orientation

Programme Objectives

7. The M. Tech programme prepares a student for a career in diverse sectors of the industry domestically and globally. The M.Tech programme facilitates learning in theory and practice of different functional areas of technologies and equips the students with an integrated approach to various functions of new technologies. However, the demand for technical skills is not limited to the industry. Technical talent is much sought by the Government Sector, NGOs, non-corporate sector as well.Students also expect to become entrepreneurs. Their aspirations

also require a broad based learning encompassing the end to end processes involved in developing entrepreneurial skills. Schools, Faculty and Students need to move away from the excessive focus on industry and look at needs and demands of broader sections of the society also.

8. Specifically the objectives of the M.Tech Programme are:-

(a) To equip the students with requisite knowledge, skills &right attitude necessary to provide effective leadership in a global environment.

(b) To develop competent Technical professionals with strong ethical values, capable of assuming a pivotal role in various sectors of the Indian Economy &Society, aligned with the national priorities.

(c) To develop proactive thinking so as to perform effectively in the dynamic socio-economic and business ecosystem.

(d) To harness entrepreneurial approach and skillsets.

Highlights of the New Curriculum

9. The New Curriculum intends to add immense value to all stakeholders by effectively addressing their requirements in more than one way by:-

(a) Enhancing the brand value of the Technical programme of Poornima University, Jaipur.

(b) Providing the much needed flexibility to carve a niche for themselves.

(c) Emphasizing the centrality of the student and teacher-student relationship in the learning process.

(d) Focusing on 'Continuous Evaluation' i.e. continuous evaluation throughout the programme.

(e) Empowering the Schools through cafeteria approach – by providing Generic Core, Subject Core, Generic Elective, and Subject Elective Courses. This shall provide in-built flexibility in the curriculum to help the Schools to offer tailor made courses preferred by students, from a wider basket of courses.

(f) More weightage is given on Continuous Evaluation Pattern.

(g) Emphasizing Experiential learning aspect through Lab Credit Courses.

(h) Supplementing traditional classroom teaching/learning with focus on group activity, field work, experiential learning, self-study, projects, Industry Exposure Programmes etc.

(i) A thorough revamp of Systems and Operations Specializations to make them more meaningful and attractive to M.Tech students.

(j) Providing opportunity to students to choose courses from other electives to explore cross-functional issues.

(j) Emphasizing on Research, Inter-personal, Analytical, Cross-Cultural, Entrepreneurial Skills, and Global aspects of managerial careers throughout the curriculum.

Pattern

10. The Programme comprises of 4 Semesters for M.Tech, adopts the Choice Based Credit System (CBCS) and Grading System.

Choice Based Credit System

11. Choice Based Credit System (CBCS) offers wide ranging choice for students to opt for courses based on their aptitude and their career goals. CBCS works on the fundamental premise that students are mature individuals, capable of making their own decisions.

12. CBCS enables a student to obtain a degree by accumulating required number of credits prescribed for that degree. The number of credits earned by the student reflects the knowledge or skill acquired him / her. Each course is assigned a fixed number of credits based on the contents to be learnt & the expected effort of the student. The grade points earned for each course reflects the student's proficiency in that course. CBCS is a process of evolution of educational reforms that would yield the result in subsequent years and after a few cycles of its implementation.

Key Features of CBCS

13. (a) **Enriching Learning Environment**. A student is provided with an academically rich, highly flexible learning system blended with abundant provision for skill practice and activity orientation that he/she could learn in depth without sacrificing his/her creativity. There is a definite movement away from the traditional lectures and written examination.

(b) **Learn at your own pace**: A student can exercise the option to decide his/her own pace of learning- slow, normal or accelerated plan. Students can select courses according to their aptitude, tastes and preferences.

(c) **Continuous Learning & Student Centric Continuous Evaluation.**CBCS makes the learning process continuous and the evaluation process is not only made continuous but also made learnercentric. The evaluation is designed to recognize the capability and talent of a student.

(d) **Active Student-Teacher Participation**. CBCS leads to quality education with active teacher-student participation. This provides avenues to meet student's scholastic needs and aspirations.

(e) **Industry Institute Collaboration**. CBCS provides opportunities for meaningful collaboration with industry and foreign partners to foster innovation, by introduction of electives and half credit courses through the cafeteria approach. This will go a long way in capacity building of students and faculty.

(f) **Interdisciplinary Curriculum**. Cutting edge developments generally occur at the interface of two or more discipline. Interdisciplinary approach enables integration of concepts, theories, techniques, and perspectives from two or more disciplines to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline.

(g) **Employability Enhancement**. CBCS shall ensure that students enhance their skill/employability by taking up project work, entrepreneurship and vocational training.

(h) **Faculty Expertise**. CBCS shall give the Schools the much needed flexibility to make best use of the expertise of available faculty.

Programme Structure in Choice Based Credit System

14.

PROGRAMME			
SEMESTER			
COURSES			
CORE COURSES		***ELECTIVE COURSES***	
Generic Core	***Subject Core***	***Generic Elective***	***Subject Elective***

Time Schedule

15. An academic year is divided into two Semesters – Odd and Even. Odd Semester shall have I and III whereas Even semester shall have IIand IV. In each semester, courses are offered in 15 teaching weeks and the remaining 5 weeks are to be utilized for conduct of examinations and evaluation purposes.

16. For students, each week has 42 working hours spread over 5/6 days consisting of lectures, tutorials, assignments, class participation, library work, special counseling, Sports, project work, field visit, youth welfare and social activities.

17. Course. A "Course" is a component of programme, i.e. in the new system; papers will be referred to as courses. Each course is identified by a unique course code. While designing curriculum, course can have defined weightage. These weightages are called credits.

Each course, in addition to having a syllabus, has learning objectives and learning outcomes. A course may be designed to comprise lectures/ tutorials/ laboratory work/ field work/ project work/vocational training /viva voce etc. or a combination of some of these.

Core Courses

18. The Curriculum comprises of Core Courses and Elective Courses. Core courses are the foundation courses of technical education. They are compulsory for all the students. Core courses are of two types: Generic Core & Subject Core.

(a) **Generic Core.**This is the course which should compulsorily be studied by a candidate as a core requirement to complete the requirement of a degree in a said discipline of study. Therefore, Generic Core courses are mandatory and fundamental in nature. These courses cannot be substituted by any other courses. Such courses are also known as Hard Core Courses. A Hard core course may be a Theory, Practical, Seminar, Field based or Project Work based subject which is a compulsory component in the Programme Structure.

(b) **Subject Core:** A Core course may be a Subject Core if there is a choice or an option for the candidate to choose from a broad category (grouping) of subjects (specializations). These are also known as Soft Core Courses.

19. Following specializations shall be offered

S.No.	Course	Year of Starting
1	B.Tech. (Civil Engg.)	2012
3	B.Tech. (Mechanical Engg.)	2012
4	B.Tech. (Electrical Engg.)	2012
5	B. Tech. (Electronics & Communication Engg.)	2012
6	M. Tech. (Computer Engg.)	2012
7	M. Tech. (VLSI Design)	2012
8	M. Tech. (Power System)	2012
9	M. Tech. (Digital Communication)	2012
10	M. Tech. (Structural Engineering)	2012
11	M. Tech. (Transportation Engg.)	2012

12	M. Tech. (Thermal Engineering)	2012
13	M. Tech. (Industrial Auto. & Control)	2012
14	M. Tech. (Product Design & Manufacturing)	2012
15	Ph. D (in relevant Streams)	2012

For B. Tech Course:

21. Generic Core courses in Semester I and II provide foundations of Technical and Science Knowledge.
22. Generic Core courses in Semester III and IV focus on functional areas, principles and technical hand on experiences.
23. Generic Core courses in the Semester V and VI are integrative in nature along with the Core subjects, Technical Seminars and Industrial Training Seminar-I.
24. Generic Core courses in the Semester VII and VIII are integrative in nature along with the Core subjects, Technical report writing, Minor Project work, Industrial Training Seminar-II and Major Project/Dissertation.

For M.Tech Course:

25. Generic Core courses in Semester I and II provide strong foundations of Technical and Science Knowledge.

26. Generic Core courses in Semester III and IV focus on functional areas, research paper publications, thesis writing and technical software based analysis experiences.

Elective Course

27. Elective course is a course which can be chosen from a pool of courses. It may be:-

    (a) Very Specialized or advanced course focusing on a specific aspect

    (b) Supportive to the discipline of study

    (c) Providing an extended scope

    (d) Enabling an exposure to some other discipline/domain

    (e) Nurturing candidate's proficiency/skill.

28. **Open Elective (Generic Elective)**. An elective course which is common across disciplines / subjects is called a generic or open elective. 'Open Elective' courses develop generic proficiencies amongstthe students.

(a) Open elective (Generic Elective) courses, in Semester III, facilitate self-development and skill building.

29. **Subject Elective/ Department Elective**. A 'Discipline centric' elective is called 'Subject/ Department Elective.

30. ***Open Elective:***A subject elective course chosen generally from an unrelated discipline/ subject, with an intention to seek cross-functional exposure is called an Open Elective. A Subject Elective offered in a discipline / subject may be treated as an Open Elective by other discipline / subject and vice versa.

Pre-requisites for successful implementation of CBCS

31. The success of the CBCS also requires certain commitments from both the students and the teachers.

(a) The student should be regular and punctual to his/ her classes, studious in carrying out the assignments and should maintain consistency in his tempo of learning. He should make maximum use of the available library, internet and other facilities.

(b) The teachers are expected to be alert and punctual and strictly adhere to the schedules of teaching, tests, seminars, evaluation and notification of results.

(c) All teachers should notify the tentative schedule of teaching and tests of the entire semester, including the dates of tests, dates of score notification and all other schedules, which can be planned in advance.

(d) The teachers are expected to adhere to unbiased and objective evaluation and marking of continuous evaluation scores (internal examinations) which will not only maintain the confidence of the students, but, at the same time, ensure that merit is given due credit.

(e) Transparency, objectivity and quality are the key factors that will sustain a good CBCS system.

(f) At the post-graduate level, and in a professional programme, the syllabus is to be looked upon as the bare minimum requirement to be fulfilled and sufficient emphasis shall be laid on contemporary aspects, going beyond the syllabus.

Credits

32. **Credit**. The definition of 'credits' can be based on various parameters—such as the learning hours put in, learning outcomes and contact hours, the quantum of content/syllabus prescribed for the course. The credit system requires that a student progresses in the academic programmes not in terms of time (years or semesters), but in terms of courses.

33. Each course is assigned a certain credit, depending on the estimated effort put in by a student. When the student passes that course, he/she earns the credits associated with that course. In the Credit system the emphasis is on the hours put in by the learner and not on the workload of the teacher. Each credit can be visualized as a combination of 3 components viz. Lecture (L) + Tutorial (T) + Practical / Project Work (P) i.e. LTP Pattern.

34. The effort of the learner for each Credit Point may be considered under two parts:-

(a) One part consisting of the hours actually spent in class room / practical / Project work/ field work instructions.

(b) The other part consisting of notional hours spent by the Learner in self-study, in the library, peer interactions, case study, writing of technical report, research paper and assignments, projects etc. for the completion of that course.

35. Every course offered shall have three components associated with the teaching-learning process of the course, in example,

(a) Lecture – L: Classroom sessions delivered by faculty in an interactive mode.

(b) Tutorial- T: Session consisting of participatory discussion/ solving tutorial problems/ self-study by students and such other novelmethods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture sessions.

(c) Practice - P: Practice session /Project Work consisting of Hands-on experience / Field Studies / Case studies that equip students to acquire the much required skill component.

36. In terms of credits, for a period of one semester of 15 weeks:-

(a) Every ONE hour session per week of L amounts to 1 credit per semester

(b) AONE hours per week of T amounts to 0.5 credit per semester

(c) A minimum of TWO hours per week of P amounts to 1 credit per semester,

37. The teaching / learning as well as evaluation are to be interpreted in a broader perspective as follows:-

(a) Teaching – Learning Processes: Classroom sessions, Group Exercises, Seminars, Small Group Projects, Self-study, etc.

(b) Evaluation: Tutorials, Class Tests, Presentations, Field work, Assignments, Term papers, etc.

38. A course shall have either or all the three components, i.e. a course may have only lecture component, or only practice component or a combination of any two or all the three components. The total credits earned by a student at the end of the semester upon successfully completing a course are 'L + T + P'. The credit pattern of the course is indicated as L: T: P. If a course is of 3 credits then the different credit distribution patterns in L: T: P format could be 3:1:1, 3: 0 : 1, 0: 0: 1, 3: 0: 1, etc. In no instance the credits of a course can be greater than the number of hours (per week for 15 weeks) allotted to it.

39. (a) Full Credit Course: A course with weightage of 3 credits is considered as a full course. (Except for Major Project/Dissertation which are full credit courses with 12 Credits each.)

(b) Half Credit Course: A course with weightage of 2 credits is considered as a half course.

40. The B. Tech programme is a combination of

(a) Full Credit Courses (100 Marks each) :Minimum 3 Credits each

(b) Half Credit Courses (100 Marks each) :Maximum 2 Credits each

Rationale for adoption of the Credit and Grading System

41. (a) **Learner's Perspective**. The current practice of evaluation of student's performance at the end of a semester is flawed. The students are expected to express their understanding or mastery over the content included in their curriculum for a complete semester within a span of three hours and their efforts over the semester are often completely ignored. It also promotes to an unhealthy practice of cramming before the examinations and focusing on marks rather than on learning.

(b) **Evaluation Perspective**: The present system of evaluation does not permit the flexibility to deploy multiple techniques of assessment in a valid and reliable way. Moreover, the current practice of awarding numerical marks for reporting the performance of learners suffers from several drawbacks and is a source of a variety of errors. Further, the problem gets compounded due to the variations in the marks awarded in different subjects. The 'raw score' obtained by the learner, is, therefore, not a reflection of his true ability.

42. In view of the above lacunae, it is desirable that the marking system used for the declaration of results is replaced by the grading system. The system of awarding grades provides a more

realistic picture of learner's ability than the prevailing marking system. Excellence in quality education can be achieved by evaluating the true ability of the learners with the help of continuous evaluation.

Salient Features of the Grading System

43. (a) In this system, students (learners) are placed in ability bands that represent a range of scores. This ability range may be designated with alphabetical letters called as 'GRADE'.

(b) Grading reflects an individual learner's performance in the form of a certain level of achievement.

(c) The Grading system ensures natural classification in qualitative terms rather than quantitative terms since it expresses a range /band of scores to which a learner belongs such as O, A, B, C, D, E& F.

(d) Grades can be interpreted easily and directly and can be used to prepare an accurate 'profile' of a learner.

(e) A properly introduced grading system not only provides for a comparison of the learners' performance but it also indicates the quality of performance with respect to the amount of efforts put in and the amount of knowledge acquired at the end of the course by the learners.

Basics of Credit and Grading System

44. Grading is a method of reporting the result of a learner's performance subsequent to his evaluation. It involves a set of alphabets which are clearly defined and designated and uniformly understood by all the stake holders. Grading is carried out in a variety of ways. The classification of grades depends upon the reference point.

45. With 'Approach towards Grading' as the reference point, Grading may be classified as:

(a) Direct grading. When the performance exhibited by the examinees is assessed in qualitative terms and the impressions so obtained by the examiners are directly expressed in terms of letter grades, it is called, 'Direct Grading'.

(b) Indirect grading. When the performance displayed by the examinees is first assessed in terms of marks and subsequently transformed into letter grades by using different modes, it is called, 'Indirect Grading.'

46. With 'Standard of Judgment', as the reference point Grading may be classified as:-

(a) Absolute grading: The method that is based on a predetermined standard which becomes a reference point for the learner's performance is called 'Absolute Grading'. This

involves direct conversion of marks into grades irrespective of the distribution of marks in a subject.

(b) Relative grading: Relative Grading is popularly known as grading on the curve. The curve refers to the normal distribution curve or some symmetric variant of it. This method amounts to determining in advance approximately what percentage of learners can be expected to receive different grades, such as O,A,B,C,D,E,F. In this grading system the grade is not determined by the learner's performance but on the basis of group performance.

47. Absolute grading has several advantages such as

(a) The procedure is simple and straightforward to use

(b) Each grade is distinctly understandable

(c) The learner has the freedom to strive for the attainment of the highest possible grade and it enables the learners to know their strengths and weaknesses.

48. The few limitations in Absolute Grading method are that:-

(a) The distribution of scores is taken at its face value regardless of the errors of measurement creeping in due to various types of subjectivity.

(b) Besides, the cut-offs of different categories are also arbitrarily decided.

49. It is proposed to use the Indirect and Absolute Grading System for the B. Tech and M. Tech programme, i.e. the assessment of individual Courses in the concerned examinations will be on the basis of marks, but the marks shall later be converted into Grades by a defined mechanism wherein the overall performance of the Learners can be reflected after considering the Credit Points for any given course. However, the overall evaluation shall be designated in terms of Grade.

Session Duration

50. Each teaching-learning, Assessment session shall be of 60 minutes. Batch size for tutorials shall be 50% of the normal class size, subject to a minimum of 30 students.

Registration

51. It is mandatory for every student, to register every semester, for the courses opted under CBCS system, for that semester. Such registration forms the basis for a student to undergo continuous evaluation, online evaluation and end-semester examination. Application forms for University examinations are to be filled up based on the choices finalized during the registration process and submitted to the University along with the prescribed examination fee.

Examination

52. (a) Pattern of Examination: The evaluation scheme comprises of

(i) University Evaluation

(ii) Continuous Evaluation

53. for each full credit course

(a) 60 marks shall be evaluated by the University and

(b) 40 marks shall be evaluated by the respective Department

54. For each half credit course:-

(a) 60 marks shall be evaluated by the respective Department.

(b) 40 marks shall be evaluated by the University.

University Evaluation

55. There shall be University evaluation for each full credit course as per the time table announced by the University. The evaluation by the University for Full Credit Courses shall be in Written Mode (subjective – concept plus case study / application oriented type) for 100 marks.

56. **Instructions to External Paper Setters / Chairman/ Examiners**. The syllabus for each course is organized in 5 units. The end-semester University evaluation shall cover the entire syllabus prescribed for the course. For University evaluation (ESE-Written Examination – subjective type of 60 marks) of each full credit course, the question pattern shall be as follows:-

(a) Pattern of Question Paper. There shall be five questions each of 12 marks

(b) All questions shall be compulsory with internal choice within the questions. i.e. There shall be 2 questions from each unit of the curriculum with an internal option.

(c) A Question may be subdivided into sub-questions a, b, c… and the allocation of marks depend on the weightage of the topic.

ILLUSTRATIVE PATTERN OF QUESTION PAPER

Q. 1 (A)……..based on Unit 1

OR

Q.1 (B) ……..based on Unit 1.

Q.2. (A) ……..based on Unit 2

OR

Q.2 (B) ……..based on Unit 2

Q.3 (A) ……..based on Unit 3

OR

Q.3 (B) ……..based on Unit 3

Q.4 (A) ……..based on Unit 4

OR

Q.4 (B) ……..based on Unit 4

Q.5 (A) ……..based on Unit 5

OR

Q.5 (B) ……..based on Unit 5

57. Questions shall assess knowledge, application of knowledge, and the ability to synthesize knowledge. The paper setter shall ensure that questions covering all skills and all units are set. She/he shall also mandatorily submit a detailed scheme of evaluation along with the question paper. Questions shall be of three categories of difficulty level – low difficulty, average difficulty and high difficulty.

58. The duration of written examination shall be 3 hours. Students shall be provided a single answer sheet of 16 pages.

Continuous Evaluation

59. A continuous assessment system in semester system (also known as internalassessment/comprehensive assessment) is spread through the duration of course and is done by the teacher teaching the course or by the department.

60. The continuous assessment provides a feedback on teaching learning process. The feedback after being analyzed is passed on to the concerned student for implementation and subsequent improvement. As a part of continuous evaluation, the learners shall be evaluated on a continuous basis by the Department to ensure that student learning takes place in a graded manner.

61. Continuous evaluation components should be designed in such a way that the faculty can monitor the student learning & development and intervene wherever required. The faculty must share the outcome of each continuous evaluation component with the students, soon after the evaluation, and guide the students for betterment.

62. Individual faculty member shall have the flexibility to design the continuous evaluation components in a manner so as to give a balanced assessment of student capabilities across Knowledge, Skills & Attitude (KSA) dimensions based on variety of assessment tools.

Suggested Components for Continuous Evaluation

63. Suggested components for Continuous Evaluation (CE) are:-

(a) Case Study / Case let / Situation Analysis – (Group Activity or Individual Activity)

(b) Class Test

(c) Open Book Test

(d) Field Visit / Study tour and report of the same

(e) Small Group Project & Internal Viva-Voce

(f) Learning Diary

(g) Scrap Book

(h) Group Discussion

(i) Role Play / Story Telling

(j) Individual Term Paper / Thematic Presentation

(k) Written Home Assignment

(l) Industry Analysis – (Group Activity or Individual Activity)

(m) Literature Review / Book Review

(n) Model Development / Simulation Exercises – (Group Activity or Individual Activity)

(o) In-depth Viva

(p) Quiz

(q) Student Driven Activities

® News-paper reading

64. There shall be a minimum of three continuous evaluation components per full credit course as well as for each half credit course. The faculty shall announce in advance the units based on which each continuous evaluation shall be conducted. The Department shall however have the liberty to conduct additional components (beyond three). However the total outcome shall be scaled down to 40 / 60 marks for full credit and 60 / 40 for half credit courses respectively. Marks for the continuous evaluation must be communicated by the Department to the Exam Department of the University as per the schedule declared by the University.

Detailed record of the Continuous Evaluation shall be maintained by the Department. The same shall be made available to the University, on demand.

65. At the end of Continuous Evaluation (out of 40 / 60 marks) the student may get an opportunity to improve the marks if he / she gets less than (30% / 25%) of marks

66. Safeguards for Credibility of Continuous Evaluation: The following practices are encouraged to enhance transparency and authenticity of continuous evaluation:-

(a) Involving faculty members from other department

(b) Setting multiple question paper sets and choosing the final question paper in a random manner.

(c) One of the internal faculty members (other than the course teacher) acting as jury during activity based evaluations.

(d) Involvement of Industry personnel in evaluating projects / field based assignments.

(e) Involvement of alumni in evaluating presentations, role plays, etc.

(f) 100% moderation of answer sheets, in exceptional cases.

Summer Internship Project

67. At the end of Sixth Semester each student shall undertake a Summer Internship Project (SIP) for 8 /10 weeks. It is mandatory for the student to seek advance written approval from the faculty guide and the Dean of the School about the topic and organization before commencing the SIP. The SIP may or may not have a Functional Focus, i.e. the student may take up a SIP in his/her intended area of specialization or in any other functional area of management. Ideally the SIP should exhibit a cross-functional orientation. The student shall submit a written structured report based on work done during this period on the basis of suggested guidelines and research methodology. SIP may be a research project – based on primary/ secondary data or may be an operational assignment involving working by the student on a given task/assignment/project/ etc. in an organization / industry. It is expected that the SIP shall sensitize the students to the demands of the workplace. The learning outcomes and utility to the organization must be specifically highlighted. The report should be well documented and supported by:-

(a) Introduction/ Executive Summary.

(b) Objectives of the Training.

(c) Company/ Organization profile (including Organization Chart)

(d) Research Methodology (Statement of Problem, Hypothesis (if any), Research Design.

(e) Technical prospective, Data Interpretation &Technology used by Industry.

(f) Relevant activity charts, tables, graphs, diagrams, etc.

(g) Suggestions & Recommendations

(h) Conclusions

(i) References in appropriate referencing styles. (APA, MLA, Harvard, Chicago Style etc.)

(j) Appendix (Questionnaire, Data Sheets etc.)

68. It should reflect the nature and quantum of work undertaken by the student. The report must reflect 8/10 weeks of work and justify the same.

69. The student shall submit TWO hard copies & one soft copy (CD) of the project report before 10th September in Semester VII. One hard copy is to be returned to the student by the Department after the External Viva-Voce. The Department shall conduct an internal viva-voce for evaluation of the SIP for 60 marks. The Panel shall comprise of the Internal Faculty Guide & One additional faculty nominated by the Dean.

70. There shall be an external viva-voce for the SIP for 40 marks. The examiner's panel for the same shall include one external faculty member nominated by the University and one internal faculty member nominated by the Dean. The external viva-voce shall be conducted for 15 minutes at least per student.

71. The Internal & the External viva-voce shall evaluate the project based on:-

(a) Actual work undertaken by the student

(b) Student understands of the organization and business environment

(c) Outcome of the project

(d) Utility of the project to the organization

(e) Basic analytical capabilities

72. Copies of SIP report and records of evaluation shall be maintained by the Department for a period of 3 academic years.

Dissertation

73. In YearIII &IV the student shall work under the supervision of the Faculty and carry out a minor and major project work / dissertation and Technical Seminar and submit a structured report in TWO hard copies & one soft copy (CD). The student is required to conduct advanced multidisciplinary research on a topic or present a seminar report related to one (or more) of contemporary technical topics. The topic is chosen in consultation with the student's supervisor.

74. The student will prepare and present a detailed research proposal prior to starting the work. It is mandatory for the student to seek advance written approval from the faculty guide and the Dean / HOD of the School about the topic before commencing the dissertation/ Project work.

A dissertation outlining the entire problem, including a survey of literature and the various results obtained along with their solutions is expected to be produced. The student must submit the completed dissertation and make an oral / Power point presentation of the same. Through the dissertation, the student is expected to furnish evidence of competence in understanding varied aspects of the theme/topic selected and a deep understanding of the specialty area. The completion of the dissertation / project shall be certified by the Faculty Guide & approved by the Dean of the School.

75. The student can undergo desk research or industrial research and can follow the guidelines mentioned in the SIP for preparation of their final hard copy.

Assessment & Grade Point Average

76. The performance of a student will be evaluated in terms of two indices, viz. a) Semester Grade Point Average (SGPA) which is the Grade Point Average for a semester b) Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters at any point in time.

77. **Semester Grade Point Average (SGPA)**. At the end of each semester, SGPA is calculated as the weighted average of GPI of all courses in the current semester in which the student has passed, the weights being the credit values of respective courses.

SGPA = Grade Points divided by the summation of Credits of all Courses.

$$\sum \{C * GPI\} \text{ SGPA } / \sum C \text{ for a semester}$$

Where GPI is the Grade and C is credit for the respective Course.

Cumulative Grade Point Average (CGPA): Cumulative Grade Point Average (CGPA) is the grade point average for all completed semesters. CGPA is calculated as the weighted average of all GPI of all courses in which the student has passed up to the current semester.

Cumulative Grade Point Average (CGPA) for the Entire Course

$$CGPA = \sum \{C * GPI\} / \sum C \text{ for all semesters taken together.}$$

Where GPI is the Grade and C is credit for the respective Course.

Assessment and Grade Point Average

(a) The system of evaluation will be as follows

(i) Each Continuous Evaluation / Assessment and ESE (ETE) will be evaluated in terms of marks. The marks for Continuous Assessment and ESE (ETE) will be added to convert into a grade and later a grade point average. There is no grade independently for CA or ESE (ETE).

(ii) Result of a student will be declared for each semester after the ESE (ETE) only.

(iii) The student will get a Grade Sheet with total grades earned and a Grade Point Average, after earning the minimum number of credits towards the completion of a UG and PG program.

Marks	Grade	Grade Point
80-100	O : Outstanding	10
70-79	A+ : Excellent	9
60-69	A : Very Good	8
55-59	B+ : Good	7
50-54	B : Above Average	6
45-49	C : Average	5
40-44	P : Pass	4
0-39	F : Fail	0
-	Ab : Absent	0

Guidelines for Open Elective

78. **Open Elective Course:** Open Elective course can be chosen from a pool of courses and are:

- Very specific or specialized or advanced to the discipline / subject of study
- Supportive to the discipline/ subject of study
- Providing an expended scope
- Enabling an exposure to some other discipline/subject/domain
- Nurturing candidate's proficiency/skill.

DETAILS OF TECHNICAL COURSES

79. School of Engineering & Technology offering the following courses.

S.No.	Course	Year of Starting
1	B.Tech. (Civil Engg.)	2012
3	B.Tech. (Mechanical Engg.)	2012
4	B.Tech. (Electrical Engg.)	2012
5	B.Tech. (Electronics & Communication Engg.)	2012
6	M.Tech. (Computer Engg.)	2012
7	M.Tech. (VLSI Design)	2012
8	M.Tech. (Power System)	2012
9	M.Tech. (Digital Communication)	2012
10	M.Tech. (Structural Engineering)	2012

11	M.Tech. (TrasportationEngg.)	2012
12	M.Tech. (Thermal Engineering)	2012
13	M.Tech. (Industrial Auto. & Control)	2012
14	M.Tech. (Product Design & Manufacturing)	2012
15	Ph.D (in relevant Streams)	2012

ELIGIBILITY CRITERIA

80. Eligibility criteria for admitting in the following courses is given below.

S. No	Course	Eligibility
1.	B. Tech	● Pass in 10+2 with minimum 50% (45% for SC/ST/Non Creamy Layer OBC/SBC) ● Marks in aggregate from CBSE/ equivalent board along with 45% (40% for SC/ ST/OBC/SBC)marks ● Mathematics and Physics as Compulsory subjects and any one of Chemistry/ Computer Science/ IP/Biology/ Bio-technology. ***For Lateral Entry Criteria*** ● 3-Year diploma in relevant branch from state board of technical education/ recognized university/ B.Sc with mathematics as one of the subject/ equivalent qualification with a minimum of 50% marks (45% for SC/ST/OBC/SBC)
2.	M. Tech	● BE/ B.Tech/ equivalent in relevant discipline with 55 % marks or 6.25 CGPA on 10 points Scale (50% or 5.75 CGPA on 10 points scale for ST/SC/OBC/SBC) ● Candidate with MCA/ M. Sc (IT) will also be considered for M. Tech in computer Engineering.
3.	Ph. D	● A Master's degree in Engineering/Technology/Science of a recognized Indian University, or a degree approved by the Association of Indian Universities, or any other equivalent qualification in the relevant field. Not less than 55 % marks in aggregate or its equivalent grade B in the UGC 7-point scale. ● Provided that a relaxation of 5 % of marks (from 50% to 45%) shall be allowed for the candidates belonging to SC/ST/OBC (Non-Creamy layers) /Differently-abled category in the entrance examination conducted by the Universities. ● A relaxation of 5% of marks from 55 % to 50% or an equivalent relaxation of grade shall be allowed for candidates who had obtained their Master's degree prior to 19th September 1991. The eligibility of 55% (or an equivalent grade) and the relaxation shall be permissible on qualifying marks without including grace marks.

COMPONENT WISE MARKS DISTRIBUTION

81. Examination component and their marks distribution.

MARKS DISTRIBUTION				
S.No	**Exam Component**	**Theory (Th)**	**Practical (Pr)**	**Discp& TEP DTP/Practical**
		Max. Marks	**Max. Marks**	**Max. Marks**
A.	**Internal Evaluation (IE)**	40	60	50
	CIE-I	12	20	NA
	MSE	12	20	NA
	CIE-II	06	10	NA
	Attendance	10	10	NA
B.	**End Semester Exam (ESE)**	60	40	NA
	Total	**100**	**100**	**50**

82.1. IE – Attendance Marks both Theory & Practical Courses :

At the end of the semester, the marks for attendance (both for Theory & Practical) will be finalized by each course teacher/instructor/faculty on the basis of total attendance of his/her course as per the guideline indicated following table :

S. No	Total Attendance (TA in % Range)	Marks (Out of 10)
1	95% ≤ **TA**	10
2	90 % ≤ **TA**< 95%	09
3	85 % ≤ **TA**< 90%	08
4	80 % ≤ **TA**< 85%	07
5	70 % ≤ **TA**< 80%	06
6	60 % ≤ **TA**< 70%	05
7	50 % ≤ **TA**< 60%	04
8	40 % ≤ **TA**< 50%	03
9	30 % ≤ **TA**< 40%	02
10	20 % ≤ **TA**< 30%	01
11	**TA**< 20%	00

82.2. Minimum Passing Percentage Components

Minimum Passing Percentage

S. No	Programme	IE	ESE	Total
1	B.Tech	35%	45%	50%
2	M. Tech	30%	40%	40%
3	Ph. D	-----	------	50%

82.2.1 It must be noted that at the end of each semester the marks of IE component stands fixed. They now remain unchanged and can't be improved upon. All the chances of improvement for IE will be given within the semester itself. Moreover the minimum passing percentage in IE component is optional.

82.2.2 If the student attains the minimum percentage in the ESE & Total Components of a particular course then that course will be considered as Clear and will be awarded the "PASS" status, if not the course attains "BACK" status. Additionally a course can be awarded "GPASS" Status if a student passes it by award of Grace marks.

82.2.3 Out of the total courses for which the student has registered in a particular semester, he/she will earn the credits for courses with status "PASS"/"GPASS" in that semester, irrespective of the grade obtained in them.

82.2.4 Moreover Discp& TEP Component credit will not be counted for promotion (neither in total nor in attained as it has no Pass/Back/G Pass Status.

Class Attendance & Debar Policy

82.3. Class Attendance and Debar Policy:

82.3.1 Class attendance and Marks for all courses of study will be taken from Department.

82.3.2 Apart from monthly communication for attendance, the tentative short attendance lists and final short attendance lists will be published by Chief Proctor.

82.3.3 The students have to maintain a minimum of 75% attendance, combining all courses / activities in his/her program of study.

82.3.4 If a student is unable to maintain so he/she will not be allowed to sit in the end semester examinations and has to repeat the semester.

82.3.5 For any medical issues / other participation consult department head/ department dean / proctor.

82.4 IE Improvement Policy:

82.4.1 As the IE component is fixed and cannot be improved in subsequent attempts, hence a chance will be given to the student who falls below the passing criterion, to improve each of the IE component (CIE/MSE).

82.4.2 After each head CIE/MSE a list will be published by COE office indicating Fail students in the respective component. The students will be asked (by COE office) to apply for improving IE.CIE/MSE – detailing the courses concerned. This includes absent students also.

82.4.3 Once the final list is published (by COE) office, the improvement CIE and MSE will be taken in test/exam mode only. These exams will be kept on Saturdays/off days only.

82.4.4 There will be a minimal fee - Rs 50 per subject per component (as improvement fee).

82.4.5 After improvement IE, the marks for IE are finalized and freeze for subsequent attempts.

Eligibility ESE

82.5 Eligibility for ESE (End Semester Examination)

82.5.1 he/she has filled the relevant examination form in stipulated time period.

82.5.2 If student satisfies the minimum attendance criterion

82.5.3 If student is not guilty of any act of indiscipline

Repeat Cases (Loss of an academic year)

82.6 A student has to repeat the semester if:

82.6.1 His/her attendance falls below the minimum attendance criterion

82.6.2 He/she is not promoted to next semester

82.6.3 Though the repeat student studies with his junior batch yet his maximum course duration does not changes.

82.7 End Semester Examination-Supplementary & Back:

82.7.1 End Semester Examination (ESE) will be held at the end of each semester. They can be further categorized as Main ESE, Supplementary ESE and Back ESE.

82.7.2 Supplementary ESE will be introduced from session 2019-20 to facilitate the students.

82.7.3 Barring the repeat students, all students who have a Back status for some or more courses of their main exam can appear in Supplementary ESE. (The process of Exam Form, admit card etc remains same as in Main, Back ESE).

82.8 Supp ESE will generally be held on Saturdays, in the month of August/September during odd semester and in the month of February/ March during even semester.

82.8.1 If a student still, after supplementary ESE, is unable to clear Backlogs will now come under Back Cycle, subject to promotion rule and maximum course duration.

82.8.2 Generally ESE Main & Back will be held during 15 Nov – 15 Dec (odd semester) and 15 April 15 May (even semester) (considering no gap/break after odd semester).

82.8.3 The ESE Theory will be held in two sessions (9-12 and 12:30-3:30).

82.8.4 The student will be given 15-20 days duration to fill the exam form with normal fee, further with late fee etc., the last date being 10-15 days prior to last teaching day.

82.8.5 If some student accidently forgot and wishes to fill after last date, he has to give the application for same, otherwise a undertaking stating that he will not sit in the exams.

82.8.6 A minimum two day window may open just before the last teaching day to give chance to such students, based on the decisions of a committee.

82.8.7 In no case the exam form will be filled on the day of commencement of theory exam or later.

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POORNIMA UNIVERSITY								
School of Engineering & Technology								
Name of Program: M. Tech. Digital Communication, Batch: 2021 Onwards								
Teaching Scheme for Year – I, Semester- I								
Course Code	Course Name	Teaching Scheme (Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	**University Core Courses**							
A.1	**Theory**							
	-	-	-	-	-	-	-	-
A.2	**Practical**							
	-	-	-	-	-	-	-	-
B.	**Department Core Courses**							
B.1	**Theory**							
MDCCEE1101	Advanced Digital Communication	4	-	-	40	60	100	4
MDCCEE 1102	Digital Signal Processing	4	-	-	40	60	100	4
B.2	**Practical**							
MDCCEE 1201	Communication System Lab-I	-	-	2	60	40	100	1
C.	**Department Elective: Any Two**							
MDCEEE1101	RF & Microwave Circuit Design	4	-	-	40	60	100	4
MDCEEE1102	Satellite Communication	4	-	-	40	60	100	4
MDCEEE1103	Advanced Optical Communication	4	-	-	40	60	100	4
MDCEEE1104	Computer Communication	4	-	-	40	60	100	4
MDCEEE1105	Embedded Networking	4	-	-	40	60	100	4
MDCEEE1106	Data Communication Networks	4	-	-	40	60	100	4
MDCEEE1107	Wireless Communication Systems	4	-	-	40	60	100	4
MDCEEE1108	Computational Methods for Communication	4	-	-	40	60	100	4
D.	**Open Elective: Anyone**							
	-	-	-	-	-	-	-	-

E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
MDCCHM1202	Soft Skills-I	-	-	2	60	40	100	1
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
MDCCEE1301	Seminar-I	-	-	2	60	40	100	1
G.	**Social Outreach, Discipline, TEP, VAC& Extra Curricular Activities**							
MDCCEE1601	Discipline and Talent Enrichment Programme	-	-	2	50	-	50	1
	Total	**16**		**8**				**20**
	Total Teaching Hours	**24**						

POORNIMA UNIVERSITY								
School of Engineering & Technology								
Name of Program: M. Tech. Digital Communication, Batch: 2021 Onwards								
Teaching Scheme for Year – I, Semester- II								
Course Code	**Course Name**	**Teaching Scheme (Hrs per Week)**			**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorials (T)**	**Practical (P)**	**IE**	**ESE**	**Total**	
A.	**University Core Courses**							
A.1	**Theory**							
	-	-	-	-	-	-	-	-
A.2	**Practical**							
	-	-	-	-	-	-	-	-
B.	**Department Core Courses**							
B.1	**Theory**							
MDCCEE2101	Information Theory & Coding	**4**	-	-	**40**	**60**	**100**	**4**
MDCCEE 2102	Research Methodology	**4**	-	-	**40**	**60**	**100**	**4**
B.2	**Practical**							
MDCCEE2201	Communication System Lab -II	-	-	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: At least Two**							
MDCEEE2101	Advance Computer Networks	**4**	-	-	**40**	**60**	**100**	**4+4**
MDCEEE2102	Wireless Communication and Adhoc Network	**4**	-	-	**40**	**60**	**100**	
MDCEEE2103	Artificial Intelligence & Neural Networks	**4**	-	-	**40**	**60**	**100**	
MDCEEE2104	Modeling & Simulation of Data Networks	**4**	-	-	**40**	**60**	**100**	

MDCEEE2105	Digital Image Processing	**4**	**-**	**-**	**40**	**60**	**100**	
MDCEEE2106	Networking Programming	**4**	**-**	**-**	**40**	**60**	**100**	
MDCEEE2107	Pervasive Computing	**4**	**-**	**-**	**40**	**60**	**100**	
MDCEEE2108	Optimization Techniques	**4**	**-**	**-**	**40**	**60**	**100**	
D.	**Open Elective: Anyone**							
	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
MDCCHM2202	Soft Skills-II	-	-	2	60	40	100	1
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
MDCCEE2301	Seminar-II	-	-	2	60	40	100	1
G.	**Social Outreach, Discipline, TEP, VAC& Extra Curricular Activities**							
MDCCEE2601	Discipline and Talent Enrichment Programme	-	-	2	50	-	50	1
	Total	**16**		**8**				**20**
	Total Teaching Hours	**24**						

POORNIMA UNIVERSITY								
School of Engineering & Technology								
Name of Program: M. Tech. Digital Communication, Batch: 2021 Onwards								
Teaching Scheme for Year – II, Semester- III _____								
Course Code	**Course Name**	**Teaching Scheme (Hrs per Week)**			**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorials (T)**	**Practical (P)**	**IE**	**ESE**	**Total**	
A.	**University Core Courses**							
A.1	**Theory**							
	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
A.2	**Practical**							
	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
B.	**Department Core Courses**							
B.1	**Theory**							
MDCCEE3101	Wireless Sensor Networks	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCCEE3102	Advanced Antenna System	**4**	**-**	**-**	**40**	**60**	**100**	**4**
B.2	**Practical**							
MDCCEE3201	Communication System Lab-III	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: At least Two**							
	NIL	**-**	**-**	**-**	**-**	**-**	**-**	**-**
D.	**Open Elective: Anyone**							
	As per attached annexure	**4**	**-**	**-**	**40**	**60**	**100**	**4**

E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
MDCCEE3202	Review/Research Paper	-	-	2	60	40	100	1
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
MDCCEE3301	Dissertation Part-I	-	-	12	60	40	100	6
G.	**Social Outreach, Discipline, TEP, VAC& Extra Curricular Activities**							
MDCCEE3601	Discipline and Talent Enrichment Programme	-	-	2	50	-	50	1
	Total	**12**		**18**				**21**
	Total Teaching Hours	**30**						

POORNIMA UNIVERSITY								
School of Engineering & Technology								
Name of Program: M. Tech. Digital Communication, Batch: 2021 Onwards								
Teaching Scheme for Year – II, Semester- IV								
Course Code	**Course Name**	**Teaching Scheme (Hrs per Week)**			**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorials (T)**	**Practical (P)**	**IE**	**ESE**	**Total**	
A.	**University Core Courses**							
A.1	**Theory**							
	-	-	-	-	-	-	-	-
A.2	**Practical**							
	-	-	-	-	-	-	-	-
B.	**Department Core Courses**							
B.1	**Theory**							
	-	-	-	-	-	-	-	-
B.2	**Practical**							
	-	-	-	-	-	-	-	-
C.	**Department Elective: At least Two**							
	-	-	-	-	-	-	-	-
D.	**Open Elective: Anyone**							
	-	-	-	-	-	-	-	-
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
	-	-	-	-	-	-	-	-
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							

MDCCEE4301	Dissertation Part-II	-	-	-	250	250	500	20
G.	**Social Outreach, Discipline, TEP, VAC& Extra Curricular Activities**							
MDCCEE4601	Discipline and Talent Enrichment Programme	-	-	-	50	-	50	1
	Total	-	-	-				**21**
	Total Teaching Hours							

ANNEXTURE

III SEMESTER OPEN ELECTIVE

Course Code	***Course Name***
	E-Commerce and Knowledge Management
	Water and Environmental Pollution
	IPR & Patents
	Robotics
	Digital India Implementation
	Smart City Design
	Renewable Energy

M.Tech.

Batch 2021-23

DEPARTM

POORNIMA UNIVERSITY

SCHOOL OF ENGINEERING & TECHNOLOG

Teaching Scheme & Detailed Syllabus

POORNIMA UNIVERSITY
School of Engineering & Technology
Name of Program: M. Tech. Digital Communication, Batch: 2021 Onwards

Teaching Scheme for Year – I, Semester- I

Course Code	Course Name	Teaching Scheme (Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	**University Core Courses**							
A.1	**Theory**							
	-	-	-	-	-	-	-	-
A.2	**Practical**							
	-	-	-	-	-	-	-	-
B.	**Department Core Courses**							
B.1	**Theory**							
MDCCEE1101	Advanced Digital Communication	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCCEE 1102	Digital Signal Processing	**4**	**-**	**-**	**40**	**60**	**100**	**4**

B.2	**Practical**							
MDCCEE 1201	Communication System Lab-I	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: Any Two**							
MDCEEE1101	RF & Microwave Circuit Design	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCEEE1102	Satellite Communication	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCEEE1103	Advanced Optical Communication	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCEEE1104	Computer Communication	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCEEE1105	Embedded Networking	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCEEE1106	Data Communication Networks	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCEEE1107	Wireless Communication Systems	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCEEE1108	Computational Methods for Communication	**4**	**-**	**-**	**40**	**60**	**100**	**4**
D.	**Open Elective: Anyone**							
	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
MDCCHM1202	Soft Skills-I	-	-	2	60	40	100	1
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
MDCCEE1301	Seminar-I	-	-	2	60	40	100	1
G.	**Social Outreach, Discipline, TEP, VAC& Extra Curricular Activities**							
MDCCEE1601	Discipline and Talent Enrichment Programme	-	-	2	50	-	50	1
	Total	**16**		**8**				**20**
	Total Teaching Hours	**24**						

M. Tech. DIGITAL COMMUNICATION
Syllabus – First Semester

Code: MDCCEE1101 Advanced Digital Communication 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

- To understand about Digital PAM, binary PAM formats.
- To learn about Voice digitization rate.
- To learn about AT & T and CCITT hierarchies.
- To understand the concepts - monitoring and diagnostic of Modulation Technique

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Digital PAM, binary PAM formats**, line coding, band limited digital PAM systems, Nyquist pulse shaping equalization, synchronization techniques bit and frame synchronization Coded pulse modulation

Unit 2	**Voice digitization rate (VDR)** of PCM, DPCM, DM, ADM, CVSD, log PCM, their performance comparison, VDR reduction by speech coding, VOCODERS, noise performance of PCM and DM, Digital multiplexes.
Unit 3	**AT & T and CCITT hierarchies**, quasi-synchronous multiplexes, Digital CW modulation
Unit 4	**Modulation Technique:** BPSK, DPSK, DEPSK, QPSK, PSK, QASK, BFSK, Do binary encoding, QPR coherent and non-coherent systems,
Unit 5	**Error probabilities** in PSK, DPSK, FSK, QPSK, 16 QAM, MSK, QPR and bit, Matched correlation and optimum filters and symbol error rate.

B. RECOMMENDED STUDY MATERIAL:

S. No.	Title of the Book	Author
1.	Digital Communication	HaykinsMcGraw Hill Int Edition
2.	Modern Digital & Analog Communication	B P Lathi,. Willey Eatern Ltd
3.	Communication. Systems	A B Carlson, Tata McGraw Hill

C. CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	**2**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 2	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 3	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 4	**2**	**2**	**2**	**1**	—	—	—	—	—	—	—	—

D.CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO 1	—	—	2
CO 2	—	—	2
CO 3	—	—	2
CO 4	—	—	2

Code: MDCCEE 1102 Digital Signal Processing 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand the basic principles of Discrete Time signals
- To understand and apply concepts of Z Transform
- To understand and apply concepts of I.D.F.T, computation
- To understand theory and applications of Design of F.I.R filters
- To understand theory and applications of Advanced signal processing techniques and transforms.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Discrete Time signals** - sequences, representation, Discrete Time Systems Linear, Time invariant, LTI System, properties, constant coefficient difference equation. Frequency Domain Representation of discrete time signals & systems, Discrete Time Random Signals

Unit 2	**Z Transform** properties, R.O.C, stability, Causality criterion.Inverse Z- Transform, Recursive and Non recursive systems, Realization of discrete time system.D.F.T properties, linear and circular convolution, Discrete Cosine transforms relationship between DFT & DCT.
Unit 3	**I.D.F.T, computation** of D.F.T: F.F.T Decimation in time & Decimation in frequency.F.I.R and I.I.R Systems: Basic structure of FIR & IIR, Bilinear transformation, Design of discrete time I.I.R filters Butterworth, Chebychev, Inv. Chebychev, elliptic etc.
Unit 4	**Design of F.I.R filters** by windowing rectangular, Bartlett, Hann, Hamming, Kaiser window filter, Design method, Relationship of Kaiser to other windows.Application of MATLAB for design of digital filters. Effect of finite register length in filter design.
Unit 5	**Advanced signal processing techniques and transforms:** Multi Rate Signal processing Down sampling/up sampling, Int. to discrete Hilbert transform, wavelet transform, Haar transform etc.Application of DSP to Speech Signal Processing.

B. RECOMMENDED STUDY MATERIAL:

S. No.	Title of the Book	Author
1.	Discrete Time signal processing, Prentice Hall	A.V Opprenheim and R.W Schaffer
2.	Digital Signal Processing using MATLAB	S. Mittra
3.	Digital Signal Processing, Maxwell Mcmillan	Proakis

D. CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	**2**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 2	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 3	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 4	**2**	**2**	**2**	**1**	—	—	—	—	—	—	—	—

E.CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO 1	—	—	2
CO 2	—	—	2
CO 3	—	—	2
CO 4	—	—	2

DEPARTMENT ELECTIVE

Code: MDCEEE1101 RF & Microwave Circuit Design 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

- To understand about the Wave Propagation in Networks.
- To learn about Passive Circuit Design and several drawbacks of Design of Matching networks.
- To learn about Stability Consideration in Active networks.
- To understand the concepts - monitoring and diagnostic of RF/MW Frequency Conversion Rectifier and Detector Design.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Wave Propagation in Networks:** Introduction to RF/Microwave Concepts and applications; RF Electronics Concepts; Fundamental Concepts in Wave Propagation; Circuit Representations of two port RF/MW networks

Unit 2	**Passive Circuit Design:** The Smith Chart, Application of the Smith Chart in Distributed and lumped element circuit applications, Design of Matching networks.
Unit 3	**Basic Considerations in Active Networks:** Stability Consideration in Active networks, Gain Considerations in Amplifiers, Noise Considerations in Active Networks.
Unit 4	**Active Networks:** Linear and Nonlinear Design: RF/MW Amplifiers Small Signal Design, Large Signal Design, RF/MW Oscillator Design
Unit 5	**RF/MW Frequency Conversion** Rectifier and Detector Design, Mixer Design, RF/MW Control Circuit Design, RF/MW Integrated circuit design.

B. RECOMMENDED STUDY MATERIAL:

S. No.	Title of the Book	Author
1.	Radio Frequency and Microwave Electronics Illustrated, Pearson Education (Asia) Pte. Ltd	Matthew M. Radmanesh
2.	RF Circuit Design: Theory and Applications, Pearson Education (Asia) Pte. Ltd	Reinhold Ludwig and PavelBretchko

E. CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	**1**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 2	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 3	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 4	**1**	**2**	**2**	**1**	—	—	—	—	—	—	—	—

E.CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO 1	—	—	2
CO 2	—	—	1
CO 3	—	—	2
CO 4	—	—	2

Code: MDCEEE1102 Satellite Communication 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to understand-

• The fundamental Origin and brief history of satellite communications
• How several fundamental algorithms work, particularly those concerned with sorting, searching and graph manipulation
• The space and time efficiency of Satellite Link Design •
Design of new algorithms or modify existing ones for new applications and Modulation, Multiplexing, Multiple Access Technique.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Introduction:** Origin and brief history of satellite communications, an overview of satellite engineering, satellite frequency bands for communication. **Orbital Theory:** Orbital mechanics look angle determinations, numerical examples, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication system performance, Azimuth & elevation calculations.
Unit 2	**Spacecraft Systems:** Attitude and orbit control system(AOCS), telemetry, tracking, command (TT&C) and monitoring, power systems, communications subsystems, transponders, space antennas, Equipment reliability and space qualification.
Unit 3	**Satellite Link Design:** Basic transmission theory, noise figure and noise temperature and G/T ratio, Satellite down link design, Satellite systems using small earth stations, satellite uplink design, design for specified C/N ratio, Combining C/N and C/I values in Satellite links, System design examples.
Unit 4	**Modulation, Multiplexing, Multiple Access Techniques**: Analog telephone transmission, FM theory, FM Detector theory, analog TV transmission, S/N ration Calculation for Satellite TV linking, Digital transmission, base Access techniques: FDMA, TDMA, CDMA and Random access.
Unit 5	**Propagation on Satellite:** earth paths and its influence on link design; propagation effects, rain and ice effects, elimination of the above effects. Earth station technology: Design of large antennas, equipments for earth stations video receiver, frequency coordination, VSAT technology, Direct Broadcast by satellite (DBS), INTELSAT and IMARSAT.

B. RECOMMENDED STUDY MATERIAL:

S. No.	Title of the Book	Author
1.	Satellite Communication", John Wiley & Sons	Timothy Pratt, Charles W. Bostain
2.	Satellite Communication", TMH, 3ed	Dennis Ruddy
3.	Satellite Communication Systems and Engineering", Prentice Hall	Wibur L PritanadJospeh A Suiulle

F. CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	**2**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 2	**3**	**2**	**1**	**1**	**2**	—	—	—	—	—	—	—
CO 3	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 4	**2**	**2**	**2**	**1**	—	—	—	**2**	—	—	—	—

E.CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO 1	—	—	2
CO 2	—	—	2
CO 3	—	—	1
CO 4	—	—	2

Code: MDCEEE1103 ADVANCED OPTICAL COMMUNICATION 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to understand-

- The fundamental construction and working of Optical fibers.
- Concept of Optical switching, WDM networks.
- Mechanism of WDM, DWDM, optical couplers
- Design of opto electronic devices, OTDR SONET.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Optical fibers:** review of fundamentals. Signal distortion and attenuation. Intermodal and intermodal dispersion, dispersion flattened and dispersion compensated fibers, Profile dispersion, study of PMD
Unit 2	**Laser diode and photodiode** Photo detector noise analysis, Analog and Digital communication link design
Unit 3	**WDM, DWDM, optical couplers**, Mach-Zehnder interferometer multiplexer, optical add/drop multiplexers, isolators, circulators, optical filters, tunable sources and tunable filters, arrayed waveguide grating, diffraction grating, optical amplifiers, optical integrated circuits Characterization of optical fibers
Unit 4	**OTDR SONET:** frame format, overhead channels, payload pointer, Virtual tributaries, multiplexing hierarchy
Unit 5	**SDH:**Standards, frame structure and features Optical switching, WDM networks, Classification of optical sensors. Intensity modulated, phase modulated and spectrally modulated sensors

B. RECOMMENDED STUDY MATERIAL:

S. No.	Title of the Book	Author
1.	Optical Fibre And Laser : Principles And Applications	Anuradha, New Age
2.	Opto Electronics And Fibre Optics Communication	Sarkar, D.C
3.	Optical Fiber Communications: Principles And Practice	G P Agrawal, Govind P Agrawal, Wiley
4.	Optical Communication System	Johan Gowar, Phi

G. CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	**2**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 2	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 3	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 4	**2**	**2**	**2**	**1**	—	—	—	—	—	—	—	—

E.CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO 1	—	—	2
CO 2	—	—	2
CO 3	—	—	2
CO 4	—	—	2

Code: MDCEEE1104	COMPUTER COMMUNICATION	4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand the concept of TCP/IP ref. Model in computer networks..
- To analyze Queuing theory, Data link layer protocols, error detection & correction codes in DLL.
- To understand the concept and applications of Connection management in transport layer and Data security & cryptography techniques

- **A. DETAILED SYLLABUS**

Unit	Contents
Unit 1	**Study of function** TCP/IP ref. Model in computer networks. Switching techniques & Switches, Broad band ISDN & ATM. Polling techniques, multiplexing & concentration, LAN components, transmission media used in physical layer, X.25 networks.
Unit 2	**Queuing theory**, Max. Flow Algorithm, High speed fiber optic networks, FDDI, SONET satellite networks, packets radio networks. Data link layer protocols, error detection & correction codes in DLL.
Unit 3	**Protocol performance evaluation**, protocol specification & verification, Routing and congestion in network layer, routing & congestion control algorithms. Network layer in Internet and ATM networks. Network synchronization, traffic analysis, Network management in routing control.
Unit 4	**Connection management in transport layer.** Protocols of transport layer. Internet transport protocols like TCP, UDP etc. ATM protocols.
Unit 5	**Data security & cryptography techniques**, access management in application layer, World Wide Web, e-mail, concept of virtual terminals. Study of different computer networks.

- **B. RECOMMENDED STUDY MATERIAL:**

S. No	Title of the Book	Author
1.	Computer Network	Tanenbaum, PHI
2.	Data and Computer Communication	William Stalling
3.	Computer and internet	Comer, McGraw Hill

H. CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	**2**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 2	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—
CO 3	**3**	**2**	**1**	**1**	—	—	—	—	—	—	—	—

E.CO-PSO Mapping

	PSO 1	PSO 2	PO 3

CO 1	–	–	2
CO 2	–	–	2
CO 3	–	–	2

Code: MDCEEE1105 EMBEDDED NETWORKING 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able -

- To Understand the Need, importance and scope of Embedded Networking: Introduction – Serial/Parallel Communication – Serial communication protocols.
- To understand role significance of USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication.
- To provide importance of ETHERNET.
- To understand the role of Exchanging messages using UDP and TCP.
- To understand the concept of wireless embedded networking.

- **A. DETAILED SYLLABUS**

Unit	Contents
Unit 1	**EMBEDDED COMMUNICATION PROTOCOLS:** Embedded Networking: Introduction – Serial/Parallel Communication – Serial communication protocols -RS232 standard – RS485 – Synchronous Serial Protocols -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) – PC Parallel port programming -ISA/PCI Bus protocols – Fire wire.
Unit 2	**USB AND CAN BUS:** USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC 18

	Microcontroller USB Interface – C Programs –CAN Bus – Introduction - Frames –Bit stuffing –Types of errors –Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN.
Unit 3	**ETHERNET BASICS:** Elements of a network – Inside Ethernet – Building a Network: Hardware options Cables, Connections and network speed – Design choices: Selecting components –Ethernet Controllers – Using the internet in local and internet communications – Inside the Internet protocol.
Unit 4	**EMBEDDED ETHERNET:** Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure.
Unit 5	**WIRELESS EMBEDDED NETWORKING:** Wireless sensor networks – Introduction – Applications – Network Topology – Localization –Time Synchronization - Energy efficient MAC protocols –SMAC – Energy efficient and robust routing – Data Centric routing

- **B. RECOMMENDED STUDY MATERIAL:**

S. No.	Title of the Book	Author
1.	Embedded Systems Design: A Unified Hardware/Software Introduction	Frank Vahid, Givargis, Wiley Publications
2.	Parallel Port Complete	Jan Axelson, Penram publications
3.	Advanced PIC microcontroller projects in C	Dogan Ibrahim, Elsevier 2008
4.	Embedded Ethernet and Internet Complete	Jan AxelsonPenram publications
5.	Networking wireless sensors	BhaskarKrishnamachari, Cambridge press 2005

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–
CO4	3	1	1	1	–	–	–	–	–	–	–	–
CO5	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	–	–
CO2	1	–	–
CO3	2	–	–
CO4	2	–	–
CO5	2	–	–

Code: MDCEEE1106 DATA COMMUNICATION NETWORKS 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand the basic principles of Data Communication and networking.
- To apply characteristics and learning the concepts of configurations, Protocol principles (Error control).
- To understand and apply concepts of TCP/IP Model, Protocol And Architecture.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Data Transmission Overview** of Data Communication and networking, Analog And Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding. Digital Data Communication Techniques Asynchronous And Synchronous Transmission, Error Detection and correction techniques, Physical interfaces
Unit 2	**Data Link Control:** Link Configurations, Protocol principles (Error control, Flow control), Bit Oriented and character oriented protocol, Data link layer services, Link Control. Multiplexing F.D.M. Synchronous TDM, Statistical TDM
Unit 3	**Switching and Computer Networks:**Communication Networks, Circuit Switching, Message Switching, Packet Switching, X.25, Virtual circuits and Data gram's, LAN/MAN Technologies, Medium Access control protocols (CSMA/CD, Token ring, FDDI, DQDB)

Unit 4	**Computer Communication Architecture:**OSI and TCP/IP Model, Protocol And Architecture, Inter Networking, IP addressing, structure of IP, IPv4, IPv6, and Transport layer Protocols, Session Service And Protocols, and Presentation/Application Controls.
Unit 5	**ATM Networks:** Concepts, history, Architecture, Convergence and challenges Network Operating Systems Overview of network operating systems (Windows NT/Unix/Linux), Mobile IP33N Operating System Network security Security issues, concept of firewalls, intrusion detection Systems

B. RECOMMENDED STUDY MATERIAL:

S.No	Title of the Book	Author
1.	Data And Computer Communication	William Stallings, Prentice Hall, 4th Ed.
2.	Computer Networking	Andrew Tanenbaum
3.	Data communications and networking	Forouzan
4.	Engg. approach to Computer Networking	SrinivasanKeshav, Pearson Edu.
5.	Data Networks	Bertsekas prentice Hall

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	–	–
CO2	1	–	–
CO3	2	–	–

Code: MDCEEE1107 WIRELESS COMMUNICATION SYSTEMS 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand the basic principles of physical modeling for wireless channels.

- To apply characteristics and learning the concepts of : AWGN channel capacity, resources of AWGN channel.
- To understand and apply the concepts of physical modeling of MIMO channels, modeling MIMO fading channels.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Wireless channel**: physical modeling for wireless channels, input/output model of wireless channel, time and frequency response, statistical models.
Unit 2	**Point to point communication:** detection in Rayleigh fading channel, time diversity, antenna diversity, frequency diversity, impact of channel uncertainty.
Unit 3	**Capacity of wireless channels**: AWGN channel capacity, resources of AWGN channel, Linear time invariant Gaussian channels, capacity of fading channels.
Unit 4	**MIMO 1 –** Spatial multiplexes and channel modeling: multiplexing capability of MIMO channels, physical modeling of MIMO channels, modeling MIMO fading channels.
Unit 5	MIMO II – Capacity and multiplexing architectures: V-BLAST, fading MIMO channel, receiver architectures, slow fading MIMO channel, D-BLAST. **MIMO III –** Diversity multiplexing tradeoff, universal code design.

A. RECOMMENDED STUDY MATERIAL:

S. No.	Title of the Book	Author
1.	**Fundamentals of wireless communication**	David Tse, P. Viswanath, Cambridge, 2006
2.	**Wireless communications**	Andreas Molisch, Wiley, 2009
3.	**Mobile Communication Engineering Theory and applications**	William C Y Lee, TMGH, 2008
4.	**Wireless communication**	UpenDalal, Oxford, 2009
	Wireless communications	Mark Ciampa, Jorge Olenwa, Cengage, 2007

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	2	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	–	–
CO2	2	–	–
CO3	2	–	–

Code: MDCEEE1108 COMPUTATIONAL METHODS FOR COMMUNICATION 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

- Understand the concept of Solution of linear simultaneous and transcendental equations
- Solve the operations of separation of variables orthogonal functions.
- Understand the Euler rule, Trapezoidal rule, Simpson rule, Newton Cotes method, Newton Raphson method and Gaussian Quadrature method
- Apply Fuzzy Set theory and application to communication problems, Fuzzy MATLAB tools..

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Solution of linear simultaneous and transcendental equations**, Eigen values problems, Iterative method, Jacobin's method, and solution of communication problem.
Unit 2	**Analytical method**, separation of variables orthogonal functions, series expansion, some practical applications of communication.
Unit 3	**Numerical integration**, Euler rule, Trapezoidal rule, Simpson rule, Newton Cotes method, Newton Raphson method and Gaussian Quadrature method,
Unit 4	**Finite Element method**, solution of poisson and wave equations and other communication problems.
Unit 5	**Basic MATLAB function and applications**. Fuzzy Set theory and application to communication problems, Fuzzy MATLAB tools. DFT, FFT and MATLAB tools for wavelet transform

B. RECOMMENDED STUDY MATERIAL:

S.No	Title of the Book	Author
1.	Numerical methods in science & engineering	Dr. M.K Venkataraman, The national pub. Co
2.	Computer Oriented statistical and numerical methods	B BalaguruSwamy, Macmillan India Ltd

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	3	1	1	1	–	–	–	–	–	–	–	–
CO4	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	—	—
CO2	1	—	—
CO3	2	—	—
CO4	2	—	—

Code: MDCCEE1201	**Communication System Lab-I**	**2 Credits [LTP: 0-0-2]**

A. DETAILED SYLLABUS

Unit	Contents
	Minimum 3-4 four experiments to be performed in each subject compulsory as well as Electives.

Code: MPSCHM1202	**Soft Skills-I**	**2 Credits [LTP: 2-0-0]**

Course Objectives:

- Understand what constitutes a professional environment.
- Develop positive group strategies & team spirit.
- Set specific measurable goals for themselves in their personal and/or professional life.
- Understand the skills and the intricacies involved in starting an entrepreneurial venture

- Understand the use of English, specifically in industry situations.

A. OUTLINE OF THE COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1.	**Personality Enrichment**	
2.	**Effective Management**	
3.	**Art of Communication**	
4.	**Interpersonal Skills**	
5.	**Written & Oral Communication**	

B. DETALED SYLLABUS

Unit	Unit Details
1.	**Personality Enhancement**
	● Self-Awareness, Self Esteem & Confidence , Attitude ● Branding Yourself: Assertiveness and Confidence ● The Corporate Fit-Dressing and Grooming, Corporate Dressing – Dress for Success ● Etiquette: Social etiquette, business etiquette – civic sense – social norms
2.	**Effective Management Skills**
	● Time & Stress Management: Act in time on commitment ● Planning & Prioritizing ● Emotional Intelligence: Managing Emotions
3.	**Art of Communication**
	● Interview Skills: Fluency & Expression ● Group Discussions: Structured & Unstructured ● Presentations: Voice, Body Language, Content and Visual Aids, Audience Management
4.	**Interpersonal Skills**

	● The Team Concept & Elements of Teamwork, ● Stages of Team Formation, & an Effective Team ● Essential Building Blocks of Effective Teams ● Leadership Skills: style and traits
5.	**Written & Oral Communication**
	Writing Skills: Picture perception & Story Making , Storytelling , Extempore & Paper Presentations.

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–
CO4	3	1	1	1	–	–	–	–	–	–	–	–
CO5	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	–	–
CO2	1	–	–
CO3	2	–	–
CO4	2	–	–
CO5	2	–	–

Code: MDCCEE1301	**SEMINAR-I**	**2 Credits [LTP: 2-0-0]**

A. DETAILED SYLLABUS

Unit	**Contents**
	Students will be grouped in two to three, will have to decide final thesis area, download research papers from IEEE, ACM, Elsevier, Springer etc. Summarizing paper – Reading abstracts and finding ideas, conclusion, Advantages of Their approach, the drawbacks of the papers. Generalize results from a research paper to related research problems. Comparing the approach - Identify weaknesses and strengths in recent research articles in the subject.

	Practice sessions on how to read, analyze and summarize research papers. Students in group will have to deliver seminar, prepare a report and a review paper based on analysis.

Code: MDCCEE1601	Discipline and Talent Enrichment Programme	2 Credits [LTP:2-0-0]

OVERVIEW AND OBJECTIVES:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non technical categories**.**

Discipline and Talent Enrichment Programme (TEP) shall be evaluated on the basis of its sub constituent programmes, as a complete **One credit** course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

POORNIMA UNIVERSITY								
School of Engineering & Technology								
Name of Program: M. Tech. Digital Communication, Batch: 2021 Onwards								
Teaching Scheme for Year – I, Semester- II								
Course Code	**Course Name**	**Teaching Scheme (Hrs per Week)**			**Marks Distribution**			**Credits**
		Lecture (L)	**Tutorials (T)**	**Practical (P)**	**IE**	**ESE**	**Total**	
A.	**University Core Courses**							
A.1	**Theory**							
	-	-	-	-	-	-	-	-
A.2	**Practical**							
	-	-	-	-	-	-	-	-
B.	**Department Core Courses**							
B.1	**Theory**							
MDCCEE2101	Information Theory & Coding	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCCEE 2102	Research Methodology	**4**	**-**	**-**	**40**	**60**	**100**	**4**
B.2	**Practical**							
MDCCEE2201	Communication System Lab -II	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: At least Two**							
MDCEEE2101	Advance Computer Networks	**4**	**-**	**-**	**40**	**60**	**100**	**4+4**
MDCEEE2102	Wireless Communication and Adhoc Network	**4**	**-**	**-**	**40**	**60**	**100**	

MDCEEE2103	Artificial Intelligence & Neural Networks	**4**	**-**	**-**	**40**	**60**	**100**	
MDCEEE2104	Modeling & Simulation of Data Networks	**4**	**-**	**-**	**40**	**60**	**100**	
MDCEEE2105	Digital Image Processing	**4**	**-**	**-**	**40**	**60**	**100**	
MDCEEE2106	Networking Programming	**4**	**-**	**-**	**40**	**60**	**100**	
MDCEEE2107	Pervasive Computing	**4**	**-**	**-**	**40**	**60**	**100**	
MDCEEE2108	Optimization Techniques	**4**	**-**	**-**	**40**	**60**	**100**	
D.	**Open Elective: Anyone**							
	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
MDCCHM2202	Soft Skills-II	-	-	2	60	40	100	1
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
MDCCEE2301	Seminar-II	-	-	2	60	40	100	1
G.	**Social Outreach, Discipline, TEP, VAC& Extra Curricular Activities**							
MDCCEE2601	Discipline and Talent Enrichment Programme	-	-	2	50	-	50	1
	Total	**16**		**8**				**20**
	Total Teaching Hours	**24**						

M. Tech. DIGITAL COMMUNICATION

Syllabus– Second Semester

Code: MDCCEE2101 INFORMATION THEORY & CODING 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

- To Have An Overview Of Information theory.
- To Model Shannon theorem, Shannon Hartley theorem.
- To Model Irreducibility, separatibility, coding efficiency.
- To Study Channel encoding minimum distance, error detection and correction.
- To analyze Cryptography, Encryption, and Decryption and modeling simulation of data networks.
- **A. DETAILED SYLLABUS**

Unit	Contents
Unit 1	**Information theory:** Marginal , joint and conditional entropy, information rate , Mutual information, channel capacity of various channels , Cascaded channels , repetition of signals

Unit 2	**Shannon theorem**, Shannon Hartley theorem, BW-S/N ratio trade off, continuous channel, negative entropy.
Unit 3	**Coding:** Irreducibility, separatibility, coding efficiency, source encoding, Shannon- Fano code, Huffman code, and Data compression.
Unit 4	**Channel encoding minimum distance**, error detection and correction, FEC and ARQ, block code, convolution codes, cyclic codes, signal error correction, multiple error correction,
Unit 5	**Burst error correction**, Cryptography, Encryption, and Decryption. Modeling and simulation of data networks

- **B. RECOMMENDED STUDY MATERIAL:**

S. No.	Title of the Book	Author
1.	Information theory	F.M Reza, McGraw Hill
2.	Digital and Analog Communication Systems	K.SamShanmugam, John Wiley
3.	Communication Systems : Analog and Digital	Singh &Sapre, TMH
4.	Digital Communication	B. Sklar, Pearson Education Asia

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–
CO4	3	1	1	1	–	–	–	–	–	–	–	–
CO5	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	–	–
CO2	1	–	–
CO3	2	–	–
CO4	2	–	–
CO5	2	–	–

Code: MDCCEE 2102	**Research Methodology**	**4 Credits [LTP: 4-0-0]**

COURSE OUTCOMES

The student will be able to:

CO02102.1 To be able to distinguish a purpose statement, a research question or hypothesis, and a research objective.

CO02102.2 To be able to define the meaning of a variable, and to be able to identify independent, dependent, and mediating variables

CO02102.3 To be able to distinguish between categorical and continuous measures

CO02102.4 To be able to design a good quantitative purpose statement and good quantitative research questions and hypotheses

A. DETAILED SYLLABUS

Unit	Contents
1.	**Overview of Research Methodology**
	Introduction, Mathematical tools for analysis, Research problems in management, Types of research, Research Process
2.	**Data Collection & Presentation**
	Introduction, Primary data, Secondary data, Data Presentation
3.	**Review of Basic Statistical Measures**
	Introduction, Measures of Central Tendencies, Measures of Variation, Measures of Skewness
4.	**Design and Analysis of Experiments**
	Introduction, Analysis of Variance, Completely Randomized design, Randomized complete block design, Latin square design, Duncan's multiple Range Test, Functional design, second factorial experiment, Expected Mean Square.
5.	**Basic Multivariate Analysis**
	Introduction, Correlation analysis, Forecasting, Linear regression & Time series
6.	**Algorithmic Research**
	Introduction, Algorithmic Research Problems, Types, Types of Solution Procedures, Steps of development, Steps of Algorithmic Research, Design of Experiments, Meta Heuristics for Combinational Problems.
7.	**Simulation**
	Introduction, Need for simulation, Types, Simulation Languages, case study.
8.	**Report Writing and Presentation**
	Introduction, Types of report, Guidelines for review draft, Report format, Typing Instructions, Oral Presentations

B. RECOMMENDED STUDY MATERIAL:

S.No	Title of the Book	Author
1.	Research Methodology	R. Panneerselvam, PHI
2.	Research Methodology: Methods and Trends	Dr. C. R. Kothari
3.	Research Methodology: A Step by Step Guide for Beginners	Ranjit Kumar

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–

CO4	3	2	2	2	—	—	—	—	—	—	—	—

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	—	—
CO2	1	—	—
CO3	2	—	—
CO4	2	—	—

DEPARTMENT ELECTIVE

Code: MDCEEE2101 ADVANCE COMPUTER NETWORKS 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to -

- Understand non-traditional technologies or approaches for solving hard real-world problems.
- Understand Local Area Networks - Ethernet, token ring, FDDI; switching - circuit switching, packet switching, multicasting.
- Apply Scheduling - Performance bounds, best effort disciplines, naming and addressing, protocol stack, SONET/SDH;
- Evaluate and apply • Control of Networks - QoS, static and dynamic routing, Markov chains, queueing models, Bellman Ford and Dijkstra's algorithm.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	● **Introduction :** Computer networks; Telephone networks, Networking principles; ● **Multiple Access**, multiplexing - FDM, TDM, SM;

Unit 2	● **Local Area Networks** - Ethernet, token ring, FDDI; switching - circuit switching, packet switching, multicasting;
Unit 3	● **Scheduling** - Performance bounds, best effort disciplines, naming and addressing, protocol stack, SONET/SDH;
Unit 4	● **ATM Networks** - AAL, virtual circuits, SSCOP; Internet -addressing, routing, end point control; ● **Internet protocols** - IP, TCP, UDP, ICMP, HTTP; ● **Traffic Management** - Models, classes, scheduling;
Unit 5	● **Control of Networks** - QoS, static and dynamic routing, Markov chains, queueing models, Bellman Ford and Dijkstra's algorithms, window and rate congestion control, large deviations of a queue and network, open and closed loop flow control, control of ATM networks.

B. RECOMMENDED STUDY MATERIAL:

S. No.	Title of the Book	Author
1.	**High Performance Communication Networks**‖, Harcourt Asia (Morgan Kaufmann), 2000	J. Walrand and P. Varaya
2.	**An Engineering Approach to Computer Networking**‖, Pearson Education, 1997	S. Keshav
3.	**Communication Networks: Fundamental Concepts and Key Architectures**‖, Tata McGraw Hill, 2000	A. Leon-Garcia and I. Widjaja
4.	**Computer Networking: A Top- Down Approach Featuring the Internet"**, Pearson Education, 2001	J. F. Kurose and K. W. Ross

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	–	–
CO2	1	–	–
CO3	2	–	–

Code: MDCEEE2102 WIRELESS COMMUNICATION AND ADHOC NETWORK
4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand the concept of Wireless Communication Standards- Characterization of the Wireless Channel.
- To analyze concept and applications of Adhoc Mobility Models:- Indoor and outdoor models.
- To understand the concept and applications of Transport layer.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Wireless Communication Standards-** Characterization of the Wireless Channel, Receiver Techniques for Fading Dispersive Channels, Mobility Management in Wireless Networks, Mobile IP, Space time Coding for Wireless Communication.
Unit 2	**Introduction to adhoc networks–** definition, characteristics features, applications. Adhoc Mobility Models:- Indoor and outdoor models
Unit 3	**Routing Protocols-** Design issues, goals and classification. Proactive Vs reactive routing,Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing.
Unit 4	**Transport layer-** Issues in desiging- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.
Unit 5	**Performance Analysis-** DSR and CBRP, Cluster Techniques,Incremental Cluster Maintenance Scheme.

B. RECOMMENDED STUDY MATERIAL:

S. No.	Title of the Book	Author
1.	Wireless Communication and Networking	John W. Mark, WeihuaZhuang
2.	Wireless Adhoc Networks	M. Ilyas, CRC Press
3.	Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007	C.Siva Ram Murthy and B.S.Manoj
4.	Ad hoc Networking, Addison – Wesley, 2000	Charles E. Perkins

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	–	–
CO2	1	–	–
CO3	2	–	–

Code: MDCEEE2103 ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS
4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand Neuro-Fuzzy and Soft Computing.
- To apply Adaptive Neural Networks, Supervised Learning Neural Networks.
- To understand working and applicarions of Fuzzy Sets and Genetic Algorithms in Game Playing.

- **A. DETAILED SYLLABUS**

Unit	Contents
Unit 1	**Neuro-Fuzzy and Soft Computing:** Introduction to Neuro-Fuzzy and Soft Computing. Fuzzy Set Theory, Fuzzy Rules and Fuzzy Reasoning,
Unit 2	**Fuzzy Inference Systems**. Adaptive Neural Networks, Supervised Learning Neural Networks,
Unit 3	**Learning from Reinforcement**, Unsupervised Learning and Other Neural Networks. ANFIS: Adaptive Neuro-Fuzzy Inference Systems
Unit 4	**Neuro-Fuzzy Control**, ANFIS Applications (Printed Character Recognition, Adaptive Noise Cancellation)
Unit 5	**Fuzzy Sets and Genetic Algorithms** in Game Playing,Soft Computing for Color Recipe Prediction

- **B. RECOMMENDED STUDY MATERIAL:**

S. No.	Title of the Book	Author
1.	Neuro-fuzzy and Soft Computing, PHI	J.S.R. Jang, C. – T, Son
2.	AI, a modern approach, Pearson Education	Russel and Norvig
3.	AI, Tata McGraw Hill	Rich and Knight
4.	Neural Networks in Computer Intelligence, McGraw Hill	KM Fu

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	—	—	—	—	—	—	—	—
CO2	1	2	1	1	—	—	—	—	—	—	—	—
CO3	3	2	2	1	—	—	—	—	—	—	—	—

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	—	—
CO2	2	—	—
CO3	2	—	—

Code: MDCEEE2104 MODELING & SIMULATION OF DATA NETWORKS
4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand the basic principles of Biological neural networks, Pattern analysis tasks: Classification, Regression, Clustering, Computational models of neuron.
- To apply Linear models for regression and classification.
- To understand and apply concepts of Pattern classification using perceptron.
- To understand theory and applications of Self-organizing maps.

- **A. DETAILED SYLLABUS**

Unit	Contents
Unit 1	**Introduction to artificial neural networks** : Biological neural networks, Pattern analysis tasks: Classification, Regression, Clustering, Computational models of neurons, Structures of neural networks, Learning principles
Unit 2	**Linear models for regression and classification** : Polynomial curve fitting, Bayesian curve fitting, Linear basis function models, Bias-variance decomposition, Bayesian linear regression, Least squares for classification, Logistic regression for classification, Bayesian logistic regression for classification
Unit 3	**Feed forward neural networks** : Pattern classification using perceptron, Multilayer feed forward neural networks (MLFFNNs), Pattern classification and regression using MLFFNNs, Error back propagation

	learning, Fast learning methods: Conjugate gradient method, Auto associative neural networks, Bayesian neural networks
Unit 4	**Radial basis function networks**: Regularization theory, RBF networks for function approximation, RBF networks for pattern classification **Kernel methods for pattern analysis:** Statistical learning theory, Support vector machines for pattern classification, Support vector regression for function approximation, Relevance vector machines for classification and regression
Unit 5	**Self-organizing maps:** Pattern clustering, Topological mapping, Kohonen's self-organizing map, Feedback neural networks: Pattern storage and retrieval, Hopfield model, Boltzmann machine, recurrent neural networks

- **B. RECOMMENDED STUDY MATERIAL:**

S.No	Title of the Book	Author
1.	Artificial Neural Networks, Prentice Hall of India	B.Yegnanarayana
2.	Neural Networks – A Classroom Approach, Tata McGraw-Hill	Satish Kumar
3.	Neural Networks – A Comprehensive Foundation, Prentice Hall	S.Haykin
4.	Pattern Recognition and Machine Learning, Springer	C.M.Bishop

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CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–
CO4	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	–	–
CO2	1	–	–
CO3	2	–	–
CO4	2	–	–

Code: MDCEEE2105 DIGITAL IMAGE PROCESSING 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand knowledge in the field of Digital Image Processing.
- To apply Image Enhancements in the Frequency Domain.
- To understand working and applications of Image Restoration.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Introduction:** Fundamental Steps in Digital Image Processing Components of an Image Processing System

	Digital Image Fundamentals: Elements of Visual Perception Light and the lectromagnetic Spectrum Image Sensing and Acquisition Image Sampling and Quantization Some Basic Relationships between Pixels **Image Enhancement in the spatial domain:** Background Some Basic Intensity Transformation Functions Histogram Processing Histogram Equalization Histogram Matching (Specification) Enhancement using arithmetic/logic operations Basics of Spatial filtering Smoothing Spatial Filters Sharpening Spatial Filters
Unit 2	**Image Enhancements in the Frequency Domain**: Introduction to the Fourier Transform and the Frequency Domain Smoothing Frequency Domain Filters Ideal Low pass Filters Butterworth Low pass Filters Gaussian Low pass Filters **Sharpening Frequency Domain Filters:** Ideal High pass Filters Butterworth High pass Filters Gaussian High pass Filters **Implementation:** Properties of 2-D FT Convolution and Correlation theorems The Fast Fourier Transform (FFT)
Unit 3	**Image Restoration:** A Model of the Image Degradation/Restoration Process Noise Models Restoration in the Presence of Noise Mean Filters Order-Statistics Filters Inverse Filtering Minimum Mean Square Error (Wiener) Filtering **Color Image Processing, Color Fundamentals, Color Models, Basics of Full-Color Image Processing, Color Transformations:** Formulation Color Complements Color Slicing Tone and Color Corrections Histogram Processing **Smoothing and Sharpening:** Color Image Smoothing Color Image Sharpening **Image Segmentation Based on Color:** Segmentation in HSI Color Space Segmentation in RGB Vector Space
Unit 4	**Image Compression, Fundamentals, Image Compression Model, Error-Free Compression,** Variable-Length Coding, LZW Coding **Lossy Compression:** Lossy Predictive Coding **Morphological Image Processing:** Preliminaries Erosion and Dilation Opening and Closing The Hit-or-Miss Transformation Some Basic Morphological Algorithms **Image Segmentation, Detection of Discontinuities, Edge Linking and Boundary DetectioN**
Unit 5	**Thresholding:** Foundation Basic Global Thresholding Basic Adaptive Thresholding Optimal Global and Adaptive Thresholding **Region-Based Segmentation, Representation and Description, Representation** **Boundary Descriptors, Regional Descriptors**

B. RECOMMENDED STUDY MATERIAL:

S.No	Title of the Book	Author
1.	Fundamentals of Digital Image Processing	A. K. Jain, PHI
2.	Digital Image Processing	W. K. Pralt, McGraw Hill
3.	Digital Image Processing	R.C. Gonzalez and R.E. Woods, Second Edition, Addison Wesley

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	2	2	1	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	—	—
CO2	1	—	—
CO3	2	—	—

Code -MDCEEE2106 NETWORKING PROGRAMMING 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to-

- Understand the concept of Network Programming
- Understand the concept of application development.
- To understand the concept of socket options, elementary udp sockets.
- Explain the concepts of - Ipv4 and Ipv6 interoperability – threaded servers.
- **A. DETAILED SYLLABUS**

Unit	Contents

Unit 1	• **INTRODUCTION- Introduction to Network Programming:** OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application. • **ELEMENTARY TCP SOCKETS-** Introduction to Socket Programming –Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write , close functions – Iterative Server – Concurrent Server.
Unit 2	• **APPLICATION DEVELOPMENT-** TCP Echo Server – TCP Echo Client – Posix Signal handling – Server with multiple clients – boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown – I/O multiplexing – I/O Models – select function – shutdown function – TCP echo Server (with multiplexing) – poll function – TCP echo Client (with Multiplexing)
Unit 3	• **SOCKET OPTIONS, ELEMENTARY UDP SOCKETS-** Socket options – getsocket and setsocket functions – generic socket options – IP socket options – ICMP socket options – TCP socket options –
Unit 4	Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP sockets – Domain name system – gethostbyname function – Ipv6 support in DNS – gethostbyadr function – getservbyname and getservbyport functions.
Unit 5	• **ADVANCED SOCKETS-** Ipv4 and Ipv6 interoperability – threaded servers – thread creation and termination – TCP echo server using threads – Mutexes – condition variables – raw sockets – raw socket creation – raw socket output – raw socket input – ping program – trace route program. DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

- **B. RECOMMENDED STUDY MATERIAL:**

S.No	Title of the Book	Author
1	"Advanced Programming in The UNIX Environment", Addison Wesley, 1999.	W. Richard Stevens
2	"UNIX Network Programming - Volume 1", Prentice Hall International	W. Richard Stevens
3	"**UNIX Network Programming**". Volume 2, Second Edition	W. Richard Stevens
4	"**Network Programming in C**", PHI 2002	Barry Nance

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–
CO3	2	2	2	2	–	–	–	–	–	–	–	–
CO4	3	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	—	—
CO2	2	—	—
CO3	2	—	—
CO4	2	—	—

Code: MDCEEE2107 PERVASIVE COMPUTING 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able to understand-

- The principles of operations of Ubiquitous computing
- The principles of operations of Adaptability - Mechanisms for adaptation: spectrum of adaptation
- The principles of operations of - Mobile data caching
- The principles of operations of Middleware support - Mobile middleware.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	**Fundamentals** Evolution - Ubiquitous computing -Applied pervasive computing - Pervasive computing. Principles: Decentralization -Diversification -Connectivity Simplification -Pervasive information technology -Scenarios -Roaming Environment -Infrastructure - Personalized services and the virtual pervasive home.
Unit 2	**ADAPTATION IN MOBILE AND PERVASIVE COMPUTING** Adaptability - Mechanisms for adaptation: spectrum of adaptation - Resource monitoring -Characterizing adaptation strategies -Example application architecture: Odyssey -Incorporating adaptations in applications -Support for adaptive applications.
Unit 3	**DATA DISSEMINATION, MANAGEMENT AND CONTEXT AWARE COMPUTING** Publish subscribe mode -Information caching -Challenges for distributed data management -Data dissemination - Mobile data caching - Mobile cache maintenance schemes -Mobile web caching -Context: Definitions - Types Core capabilities for context awareness - Types of context aware applications.
Unit 4	**MIDDLEWARE AND DEVICE TECHNOLOGY** Middleware support - Mobile middleware - Puppeteer -Adaptation middleware -Agents - Mobile agents - Service discovery - Hardware: Batteries -Displays -Memory - Processor - Human Machine Interface - Operating systems: Palm OS -EPOC -Windows CE -QNX Neutrino -BeOS -Embedded Linux Comparison - Java for pervasive devices.
Unit 5	**PERVASIVE APPLICATION ARCHITECTURE AND EXAMPLES 9** Background - Scalability and Availability - Application architecture -Securing pervasive computing applications -Overview of classes - Use of the framework Usage examples: Retail -Airline check in and Booking -Sales force automation -Health care -Tracking -Car information systems -E -mail access via WAP and voice.

B. RECOMMENDED STUDY MATERIAL:

S.No	Title of the Book	Author
1.	Parallel Programming with MPI	Morgan Kaufmann, Peter Pacheco
2.	The Grid: Blueprintf for a New Computing Infrastructure	Ian Foster and Carl Kesselman

3.	Grid Computing: Making the Global Infrastructure a Reality	Fran Berman, Geoffrey Fox, and Anthony G. Hey (Wiley)
4.	Grid Computing: Making The Global Infrastructure a Reality	Fran Berman , Geoffrey Fox, Anthony J.G Hey

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	3	1	1	–	–	–	–	–	–	–	–
CO3	3	2	2	2	–	–	–	–	–	–	–	–
CO4	2	2	2	2	–	–	–	–	–	–	–	–

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	–	–
CO2	2	–	–
CO3	2	–	–
CO4	2	–	–

Code: MDCEEE2108 OPTIMIZATION TECHNIQUES 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand the concept of classification of optimization.
- To analyze concept and applications of Linear Programming.
- To understand the Non-Linear Programming and its Applications
- To learns Dynamic Programming.

A. DETAILED SYLLABUS

Unit	Contents

Unit 1	**Introduction:** Historical development, application to engineering problems, statement of optimization, classification of optimization, examples of optimization problems
Unit 2	**Linear Programming:** Graphical method, simplex method, revised simplex method, Big-M method, 2-phase method, alternate optimal solutions, unbounded LPs, degeneracy and convergence,
Unit 3	Duality in linear programming, sensitivity analysis, dual simplex method, Transportation, assignment and other applications.
Unit 4	**Non-Linear Programming:** Unconstrained optimization techniques, direct search methods (Fibonacci method, golden section, quadrature and cubic interpolation) descent methods, constrained optimization, direct and indirect methods, optimization with calculas, kuhn-tucker conditions.
Unit 5	**Dynamic Programming:** principles of optimality, Multistage decision process, computational procedures in dynamic programming.

B. RECOMMENDED STUDY MATERIAL:

S.No	Title of the Book	Author
1.	Introduction to Operation Research (Seventh Edition) Tata McGraw Hill	Hiller and Lieberman
2.	Operation Research Principles and Practice , John Wiley & Sons	Ravindren Philips and Solberg

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	—	—	—	—	—	—	—	—
CO2	3	2	1	1	—	—	—	—	—	—	—	—
CO3	3	2	2	2	—	—	—	—	—	—	—	—
CO4	2	2	2	2	—	—	—	—	—	—	—	—

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	—	—
CO2	1	—	—
CO3	2	—	—
CO4	1	—	—

Code: MDCCEE2201 Communication System Lab -II 2 Credits [LTP: 0-0-2]

A. DETAILED SYLLABUS

Unit	Contents
	Minimum 3-4 four experiments to be performed in each subject compulsory as well as Electives.

Code: MPSCHM2202	Soft Skills-II	2 Credits [LTP: 2-0-0]

COURSE OUTCOMES

Students will be able:

- CO206.1: To present themselves in an effective manner and know about their short-term and long-term goals.
- CO206.1To works in a team by managing time properly and focus on personal grooming, etiquettes and body language.
- CO206.1 to demonstrate their abilities by improving skills of LSRW (Listening /Speaking/Reading/Writing).
- CO206.1 To present different viewpoints or ways of thinking about a situation , expand their abilities to resolve situations and get experience within the given context
- CO206.1 to enhance their employability skills by working on the presentation of Résumé and giving impactful performance during Group Discussion.

Unit	Unit Details
1	Self-Awareness, Self Esteem & Confidence
2	The Corporate Fit-Dressing and Grooming, Etiquette: Social etiquette, business etiquette – civic sense – social norms
3	Effective Management Skills Time & Stress Management: Act in time on commitment
4	Personal Grooming and Body language
5	Time Management & Conflict Management
6	Planning & Prioritizing, Emotional Intelligence: Managing Emotions
7	Oral Communication &Writing Skills: Extempore & Paper Presentations.
8	Selling Self/Job Hunting Writing resume / Curriculum vitae
9	Mock GD – Goal setting - Career planning
10	Mock interview or Interview skills

Code: MDCCEE2301	SEMINAR II	2 Credits [LTP: 2-0-0]

A. DETAILED SYLLABUS

Unit	Contents

	Students grouped in two to three during Semester I, will now continue to download further the research papers in the area, analyze, allocate individually, the set of papers, **Literature survey** Overview – What is literature survey, Functions of literature survey, maintaining a notebook, developing a Bibliography Methods of data collection – Observation, survey, contact methods, experimental, determining sample design Searching for publications – Publication databases, search engines and patent data bases, Find some/all of the references for a given paper, including those that are not on the web Online tools – google, CiteSeer, ACM Digital Library, IEEE, The on-line Computer Science bibliography, Survey papers, Finding material not on the web, Searching patents **Publishing a paper** How to write scientific paper Structure of a conference and journal paper, how (and How Not) to write a Good Systems Paper: Abstract writing, chapter writing, discussion, conclusion, references, bibliography, and In-class discussion of technical writing examples, Poster papers, review papers, how to organize thesis Project report, How to write a research proposal? How research is funded? Research ethics – Legal issues, copyright, and plagiarism General advice about writing technical papers in English TiDC for writing correct English Practice sessions on above will be conducted. Students will have to deliver seminar, prepare a report and a review paper based on analysis individually.

Code: MDCCEE2601	Discipline and Talent Enrichment Programme	2 Credits [LTP:2-0-0]

OVERVIEW AND OBJECTIVES:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non technical categories**.**

Discipline and Talent Enrichment Programme (TEP) shall be evaluated on the basis of its sub constituent programmes, as a complete **One credit** course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

POORNIMA UNIVERSITY				
School of Engineering & Technology				
Name of Program: M. Tech. Digital Communication, Batch: 2021 Onwards				
Teaching Scheme for Year – II, Semester- III				
		Teaching Scheme (Hrs per Week)	**Marks Distribution**	**Credits**

Course Code	Course Name	Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	**University Core Courses**							
A.1	**Theory**							
	-	-	-	-	-	-	-	-
A.2	**Practical**							
	-	-	-	-	-	-	-	-
B.	**Department Core Courses**							
B.1	**Theory**							
MDCCEE3101	Wireless Sensor Networks	**4**	**-**	**-**	**40**	**60**	**100**	**4**
MDCCEE3102	Advanced Antenna System	**4**	**-**	**-**	**40**	**60**	**100**	**4**
B.2	**Practical**							
MDCCEE3201	Communication System Lab-III	**-**	**-**	**2**	**60**	**40**	**100**	**1**
C.	**Department Elective: At least Two**							
	NIL	**-**	**-**	**-**	**-**	**-**	**-**	**-**
D.	**Open Elective: Anyone**							
	As per attached annexure	**4**	**-**	**-**	**40**	**60**	**100**	**4**
E.	**Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)**							
MDCCEE3202	Review/Research Paper	-	-	2	60	40	100	1
F.	**Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere**							
MDCCEE3301	Dissertation Part-I	-	-	12	60	40	100	6
G.	**Social Outreach, Discipline, TEP, VAC& Extra Curricular Activities**							
MDCCEE3601	Discipline and Talent Enrichment Programme	-	-	2	50	-	50	1
	Total	**12**		**18**				**21**
	Total Teaching Hours	**30**						

M. Tech. DIGITAL COMMUNICATION

Syllabus– Third Semester

Code: MDCCEE3101 Wireless Sensor Networks 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand knowledge of Challenges for Wireless Sensor Networks.
- To apply Single-Node Architecture.
- To understand working and applications of Physical Layer and Transceiver Design Considerations
- To apply Operating Systems for Wireless Sensor Networks.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	● Challenges for Wireless Sensor Networks-Characteristics requirements-required mechanisms, Difference between mobile ad-hoc and sensor networks, Applications of sensor networks-Enabling Technologies for Wireless Sensor Networks.
Unit 2	● Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts
Unit 3	Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts,
Unit 4	● Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing. Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.
Unit 5	● Operating Systems for Wireless Sensor Networks, Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

B. RECOMMENDED STUDY MATERIAL:

S.No	Title of the Book	Author
1.	Protocols And Architectures for Wireless Sensor Networks	Holger Karl & Andreas Willig, John Wiley, 2005
2.	Wireless Sensor Networks- An Information Processing Approach	Feng Zhao & Leonidas J. Guibas, Elsevier, 2007
3.	Wireless Sensor Networks-Technology, Protocols, And Applications	Kazem Sohraby, Daniel Minoli, & Taieb Znati John Wiley, 2007
4.	Wireless Sensor Network Designs	Anna Hac, "", John Wiley, 2003
5.	Networking Wireless Sensors	Bhaskar Krishnamachari, Cambridge Press,2005
6.	Handbook Of Sensor Networks: Compact Wireless And Wired Sensing Systems	Mohammad Ilyas And Imad Mahgaob, CRC Press,2005
7.	Introduction To Data Communication And Networking	Wayne Tomasi, Pearson Education, 2007

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	–	–	–	–	–	–	–	–
CO2	3	2	1	1	–	–	–	–	–	–	–	–

CO3	3	2	2	2	—	—	—	—	—	—	—	—
CO4	2	2	2	2	—	—	—	—	—	—	—	—

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	—	—
CO2	1	—	—
CO3	2	—	—
CO4	1	—	—

Code: MDCCEE3102 Advanced Antenna System 4 Credits [LTP: 4-0-0]

COURSE OUTCOMES: After Successful completion of the course students will be able-

- To understand of the theory of electromagnetic radiation.
- To apply Analysis using field equivalence principle and Fourier transform methods
- To understand working and applications of printed antennas
- To apply Paraboloidal reflector antenna, different feed configurations for different real world applications.

A. DETAILED SYLLABUS

Unit	Contents
Unit 1	● Review of the theory of electromagnetic radiation. Introduction to various antenna types wire, loop and helical antennas, analysis using assumed current distribution. ● Aperture antennas: slot, wave guide, horn, and reflector antennas.
Unit 2	● Analysis using field equivalence principle and Fourier transform methods. Linear arrays. Traveling wave & broadband antennas. Antenna measurements.
Unit 3	● Printed antennas: Feeding methods, transmission line & cavity models, analysis and design of Rectangular & circular microstrip antenna
Unit 4	● Arrays: pattern synthesis, planar arrays, phased arrays. Active antennas and arrays.
Unit 5	● Paraboloidal reflector antenna, different feed configurations, shaped beam antennas, lens antenna. ● Antennas for biomedical applications. Smart antennas for mobile communications. Antenna for infrared detectors.

B. RECOMMENDED STUDY MATERIAL:

S. No.	Title of the Book	Author
1.	Antennas	John Kraus , Ronald Marhefka,Tmh
2.	Electromagnetic Waves And Radiating Systems	E.C. Jordan And K.G. Balmain, ,Phi
3.	Antenna Theory: Analysis And Design Constantine	A. Balanis , John Wiley & Sons
4.	Antenna Theory & Design	Robert S. Elliott, John Wiley & Sons
5.	Antennas And Wave Propagation	G. S. N. Raju , Pearson
6.	Antennas And Wave Propagation	A.R. Harish, M. Sachidananda, Oxford
7.	Antenna Handbook: Antenna Theory	Y. T. Lo, S. W. Lee, Springer
8.	Antenna Theory And Practice	Chatterjee, R., New Age International

CO- PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	2	2	—	—	—	—	—	—	—	—
CO2	3	2	1	1	—	1	—	—	—	—	—	—
CO3	3	3	2	2	—	—	—	—	—	—	—	—
CO4	2	2	2	2	—	—	—	—	—	—	—	—

CO-PSO Mapping

	PSO 1	PSO 2	PO 3
CO1	2	—	—
CO2	2	—	—
CO3	2	—	—
CO4	1	—	—

Code: MDCCEE3201 Communication System Lab-III Credits [LTP: 0-0-2]

B. DETAILED SYLLABUS

Unit	Contents
	• 3-4 Experiments based on each theory subject will have to be carried out.

OPEN ELECTIVE

Code:MOE03101	E- Commerce & Knowledge Management	4 Credits [LTP:4-0-0]

COURSE OVERVIEW AND OBJECTIVES

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems

COURSE OUTCOME

The student would be able to

CO03115.1 Understand the basic concepts and technologies used in the field of management information systems;

CO03115.2To impart the knowledge of the different types of management information systems;

CO03115.3 To Understand the processes of developing and implementing information systems;

CO03115.4 To aware of the ethical, social, and security issues of information systems;

CO03115.5 To familiarize students with organizational and managerial foundations of systems

A. OUTLINE OF COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	**INTRODUCTION TO ELECTRONIC COMMERCE**	9
2.	**BUILDING OWN WEBSITE**	8
3.	**INTERNET AND EXTRANET**	9
4.	**ELECTRONIC DATA INTERCHANGE**	9
5.	**PLANNING FOR ELECTRONIC COMMERCE**	9

B. Detailed Syllabus

Unit	Unit Details
Unit 1	**INTRODUCTION TO ELECTRONIC COMMERCE** Introduction of Unit, what is E-Commerce (Introduction and Definition), Main activities E- Commerce, Goals of E-Commerce, Technical Components of E-commerce, Functions of E- commerce, Advantages and Disadvantages of E-commerce, Scope of E-commerce, Electronic commerce Applications, Electronic commerce and Electronic Business, Conclusion of Unit.
Unit 2	**BUILDING OWN WEBSITE** Introduction of Unit, Reasons for building own website, Benefits of website, Bandwidth requirements, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Banner Exchange, Shopping Bots, Conclusion of Unit
Unit 3	**INTERNET AND EXTRANET** Introduction of Unit, Definition of Internet, Advantages and Disadvantages of the Internet, Component of an Intranet Information technology structure, Development of a Intranet, Extranet and Intranet Difference, Role of Intranet in B2B Application, Conclusion of Unit.

Unit 4	**ELECTRONIC DATA INTERCHANGE** Introduction of Unit, Concepts of EDI and Limitation, Application of EDI, Disadvantages of EDI, EDI model, Conclusion of Unit.
Unit 5	**PLANNING FOR ELECTRONIC COMMERCE** Introduction of Unit, planning electronic commerce initiatives, linking objectives to business strategies, measuring cost objectives, comparing benefits to costs, strategies for developing electronic commerce web sites, Conclusion of Unit.

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author
1.	E-Commerce	Greenstein & Feinman, Tata McGrew Hill
2.	Frontiers of Electronic Commerce	Kalakota Winston ,Pearson Education
Important Web Links:		
1. https://www.kmslh.com/3-reasons-why-ecommerce-must-have-knowledge-management/		
2. https://link.springer.com/chapter/10.1007/978-3-642-23993-9_31		
3. https://ieeexplore.ieee.org/document/5279962		
4. https://www.sciencedirect.com/science/article/pii/S0268401207001120		
5. https://www.slideshare.net/monoaziz/knowledge-management-1852596		

Code: MOE03102 Water and Environmental Pollution 4 Credits [LTP:4-0-0]

COURSE OVERVIEW AND OBJECTIVES

The aim of this course is to teach students about current environmental problems. From an environmental perspective, the student will learn how to develop an activity using various strategies to control, reduce and monitor all environmental problems that might arise as a result.

COURSE OUTCOME

The student would be able to

CO03114.1 To be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.

CO03114.2 To be able to analyse an industrial activity and identify the environmental problems.

CO03114.3 TO be able to plan strategies to control, reduce and monitor pollution.

CO03114.4 To be able to select the most appropriate technique to purify and/or control the emission of pollutants.

CO03114.5 To be able to apply the basis of an Environmental Management System (EMS) to an industrial activity.

A.OUTLINE OF COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	**WATER AND WATER ANALYSIS**	9
2.	**WASTEWATER AND THEIR TREATMENT**	8
3.	**GLOBAL ATMOSPHERIC CHANGE**	9
4.	**AIR POLLUTION & METEOROLOGY**	9
5.	**SOLID WASTE MANAGEMENT**	9

A. DETAILEDSYLLABUS

Unit 1	**WATER AND WATER ANALYSIS** Water resources, Sources of water, characteristics of water, water pollutants, oxygen demanding wastes, surface water quality, ground water quality. Municipal water supply: Requisites of drinking water, Steps involved in treatment of water
Unit 2	**WASTEWATER AND THEIR TREATMENT** Wastewater Characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards. wastewater treatment systems, disposal scope
Unit 3	**GLOBAL ATMOSPHERIC CHANGE** The atmosphere of earth, greenhouse effect, radiative forcing of climate change, global warming potential, carbon cycle, carbon emissions from fossil fuels, regional impacts of temperature change, global initiatives.
Unit 4	**AIR POLLUTION & METEOROLOGY** Atmospheric motion, Lapse rate, atmospheric stability, inversion, atmospheric dispersion, maximum mixing depth, Air quality standards, plume rise, emission controls. Air pollution control methods in industries. **NOISE POLLUTION:** Effect of noise on people, rating systems, community noise sources and criteria, traffic noise prediction, noise control
Unit 5	**SOLID WASTE MANAGEMENT** Integrated solid waste management, hazardous waste management, biomedical waste treatment technologies and disposal options, e-waste management, waste minimization for sustainability, waste management – Indian scenario.

B. RECOMMENDED STUDYMATERIAL:

S.No	Title of the Book	Author
1.	Environmental Engineering	Howard S Peavy, Donald RRowe, George Tchobanoglous
2.	Engineering: Treatment, and Reuse, 4th edition, Tata McGraw Hill, 2007.	Metcalf and Eddy Inc
3.	Manual for Water Treatment.	Ministry of Urban development, Govt of India
4.	Manual for Sewage Treatment	Ministry of Urban development, Govt of India

5.	Air Pollution	M N Rao
6.	Air Pollution Control Engineering	De Nevers
7	Solid Wastes: Engineering principles and Management issues	Tchobanoglous G.

Important Web Links:

1. https://www.google.co.in/search?biw=1366&bih=608&ei=Y4HLXvytHffYz7sPn9eB4AY&q=water+and+enviroment+polluation+nptel&oq=water+and+enviroment+polluation+nptel&gs_lcp=CgZwc3ktYWIQAzIKCCEQFhAKEB0QHjIKCCEQFhAKEB0QHjIKCCEQFhAKEB0QHjoECAAQRzoGCAAQFhAeOgcIIRAKEKABUIsYWP4mYMItaABwAXgAgAG8AogBuw2SAQcwLjEuNS4xmAEAoAEBqgEHZ3dzLXdpeg&sclient=psy-ab&ved=0ahUKEwi868D4y87pAhV37HMBHZ9rAGwQ4dUDCAw&uact=5\
2. https://www.nrdc.org/stories/water-pollution-everything-you-need-know
3. https://www.environmentalpollutioncenters.org/water/
4. https://www.explainthatstuff.com/waterpollution.html
5. https://wwf.panda.org/knowledge_hub/teacher_resources/webfieldtrips/water_pollution/

Code:MOE03103	IR& Patents	4 Credits [LTP:4-0-0]

COURSE OVERVIEW AND OBJECTIVES: The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.Further teacher will have to demonstrate with products and ask the student to identify the different types of IPR's

COURSE OUTCOME:

CO03116.1 To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.

CO03116.2 To disseminate knowledge on patents, patent regime in India and abroad and registration aspects

CO03116.3 To acquire knowledge on copyrights and its related rights and registration aspects

CO03116.4 To understand knowledge on trademarks and registration· aspects

CO03116.5 To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects

A. OUTLINE OF COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	**INTRODUCTION TO IPR**	9
2.	**TYPES OF IPR AND WIPO**	8
3.	**LEGAL AND COMMERCIAL ASPECTS OF IPR**	9
4.	**INTRODUCTIONS TO PATENTS**	9
5.	**PATENT PROCEDURES**	9

B. DETAILED SYLLABUS

Unit	Unit details
Unit 1	**INTRODUCTION TO IPR** General Regime of Intellectual Property Rights, Concept of Property vis-à-vis Intellectual Property, Concept of Property and Theories of Property - An Overview. Theories of Intellectual Property Rights, Intellectual Property as an Instrument of Development, Need for Protecting. Intellectual Property- Policy Consideration- National Perspectives and International demands.
Unit 2	**TYPES OF IPR AND WIPO** Types of Intellectual Property- Origin and Development- An Overview, Intellectual Property Rights as Human Right, Role of International Institutions, World Intellectual Property Organization (WIPO), Function of WIPO, Membership of WIPO, Agreement between the WIPO and the WTO.
Unit 3	**LEGAL AND COMMERCIAL ASPECTS OF IPR** Dispute Settlement- New Treaties, Commercialization of Intellectual Property Rights by Licensing, Determining Financial Value of Intellectual Property Rights, Negotiating Payments Terms in Intellectual Property Transaction, Intellectual Property Rights in the Cyber World.
Unit 4	**INTRODUCTIONS TO PATENTS** Introduction to Patent Law, Paris Convention, Patent Cooperation Treaty, WTO- TRIPS, Harmonization of CBD and TRIPs, Indian Patent Law, The Patents Act, 1970, Amendments to the Patents Act, Patentable Subject Matter, Patentability Criteria.
Unit 5	**PATENT PROCEDURES** Procedure for Filing Patent Applications, Patent Granting Procedure, Revocation, Patent Infringement and Remedies, Relevant Provisions of the Biological Diversity Act, 2002, Access and Benefit SharingIssues.

C. RECOMMENDED STUDY MATERIAL:

S. No	Title of the Book	Author
1.	Intellectual Property Rights in India	VK Ahuja (Lexis Nexis butter worths Publications)
Important Web Link:		
1.	https://www.cencenelec.eu/ipr/Pages/default.aspx	
2.	http://www.ipindia.nic.in/	
3.	https://en.wikipedia.org/wiki/Intellectual_property	

4. https://en.wikipedia.org/wiki/Intellectual_propert
5. https://www.itu.int/en/ITU-T/ipr/Pages/default.aspx

Code:MOE03104	Robotics	4 Credits [LTP:4-0-0]

COURSE OVERVIEW AND OBJECTIVES: To understand the basic concepts associated with the design and Functioning and applications of Robots To study about the drives and sensors used in Robots To learn about analyzing robot kinematics and robot programming.

COURSE OUTCOME:

The student would be able to:

CO03117.1 To be able to introduce basics of robotics.
CO03117.2 To understand robot kinematics and robot programming
CO03117.3 To understand the application of Robots
CO03117.4 To learn about force and torque sensing
CO03117.5 To acquire knowledge of robotics programming.

A. OUTLINE OF COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	FUNDAMENTALS	9
2.	ROBOT KINEMATICS	9

3.	**ROBOT DYNAMIC ANALYSIS AND FORCES**	**8**
4.	**ACTUATORS AND SENSORS**	**9**
5.	**ROBOT PROGRAMMING, SYSTEMS AND APPLICATIONS**	**9**

B. Detailed Syllabus

Unit	Unit details
Unit 1	**FUNDAMENTALS** Historical information, robot components, Robot characteristics, Robot anatomy, Basic structure of robots, Resolution, Accuracy and repeatability, Position Analysis forward and inverse kinematics of robots, Including frame representations.
Unit 2	**ROBOT KINEMATICS** Transformations, position and orientation analysis and the Denavit-Hartenberg representation of robot kinematics, The manipulators, The wrist motion and grippers. Differential motions, Inverse Manipulator Kinematics: Differential motions and velocity analysis of robots and frames.
Unit 3	**ROBOT DYNAMIC ANALYSIS AND FORCES** Analysis of robot dynamics and forces, Lagrangian mechanics is used as the primary method of analysis and development. Trajectory Planning: Methods of path and trajectory planning, Both in joint-space and in Cartesian-space.
Unit 4	**ACTUATORS AND SENSORS** Actuators, including hydraulic devices, Electric motors such as DC servomotorsand stepper motors, Pneumatic devices, as well as many other novel actuators, It also covers microprocessor control of these actuators, Mechatronics, Tactile sensors, Proximity and range sensors, Force and torque sensors, Uses of sensors in robotics.
Unit 5	**ROBOT PROGRAMMING, SYSTEMS AND APPLICATIONS** Robot languages, Method of robots programming, Lead through programming methods, A robot programs as a path in space, Motion interpolation, WAIT, SIGNAL and DELAY commands, Branching capabilities and limitation of lead through methods and robotic applications. Basic principles of fuzzy logic and its applications in microprocessor control and robotics.

C. RECOMMENDED STUDYMATERIAL:

S.No	Title of the Book	Author
1.	Robotics Control Sensing, Vision and Intelligence	McGraw Hill Gonzalez, R. C., Fu, K. S. and Lee, C.S.G.
2.	Robotics for Engineers	McGraw Hill Koren,Y
3.	Introduction to Robotics, Analysis, Systems, Applications,	Dorling Kingsley, Dorling Kingsley Niku, S.B
4.	Programming robot controllers	McGraw Hill Predko, M
Important Web Links:		
1. https://nptel.ac.in/courses/112/105/112105249/		

2. https://nptel.ac.in/courses/112/101/112101099/
3. https://nptel.ac.in/courses/112/101/112101098/
4. https://swayam.gov.in/nd1_noc20_me03
5. https://www.youtube.com/watch?v=DaWMvEY3Qgc

Code: MOE03104	Digital India Implementation	[LTP:4-0-0]

COURSE OVERVIEW AND OBJECTIVES: The Digital India programme aims to provide broadband highways, universal access to mobile connectivity, public internet access programme, e-governance: Reforming government through technology, eKranti - Electronic delivery of services, Information for all, Electronics manufacturing: Target net zero imports, IT for jobs and early harvest programmes

COURSE OUTCOME:

At the end of the course students will be able to:
CO03111.1. Understand concepts and objectives digital India and digital infrastructure.
CO03111.2 Understand the pillars of the digital India.
CO03111.3 Understand the concept of new digital services and platforms for implementations purpose.
CO03111.4 Understand the various digital facilities to empower citizen.
CO03111.5 Apply the digital India initiative for training objective.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)
1.	Digital India Initiative	8
2.	Focus Area	8
3.	Implementation	9
4.	Facilities To Digitally Empower Citizen	7

5.	Training	8

B. DETAILEDSYLLABUS

Unit	Unit Details
1.	**Digital India Initiative**
	Concept, aims and objectives, opportunities, inclusive growth in areas of electronic services, products, manufacturing and job opportunities, centered on three keyareas – Digital Infrastructure as a Utility to Every Citizen, Governance & Services on Demand and Digital Empowerment of Citizens.
2.	**Focus Area**
	The Government of India specifically targets nine 'Pillars of the Digital India' as follows: Broadband Highway, Universal Access to Mobile connectivity, Public Internet Access Programme, E-Governance, reforming Government through Technology, E- Kranti, electronic delivery of services, Information for All, Electronics Manufacturing, IT for Jobs
3.	**Implementation**
	New digital services, MyGov.in is a platform to share inputs and ideas on matters of policy and governance, UMANG (Unified Mobile Application for New-age Governance) ,AADHAR,Digi-Locker,Bharat Bill Payment System, PAN, EPFO services, PMKVY services, Indian railway tickets bookings, birth certificates, e-District, e-Panchayat, e-Sign framework, Swachh Bharat Mission(SBM) Mobile app, e-Hospital application, Digital attendance.
4.	**Facilities To Digitally Empower Citizen**
	Digital locker facility, eliminating the use of physical documents and enables the sharing of verified electronic documents across government agencies, three key stakeholders of citizen, issuer and requester. BPO and job growth, government is planning to create 28,000 seats of bpos in various states and set up at least one common service centre in each of the gram panchayats in the state. Easy access to a common services center (CSC), Shareable private space on a public cloud, Safe and secure cyberspace, Universally accessible digital resources, Collaborative digital platforms for intergovernmental operations. E- Samparkvernacular email service: connect rural India with the digital India, the government of India impelled email services provider giants including Gmail, office and rediff to provide the email address in regional languages, anIndian-based company, data Xgen technologies pvt.ltd, has launched world‟s first free linguistic email address under the name „Data mail‟ which allows creating email ids in 8 Indian languages, English; and 3 foreign languages – Arabic, Russian and Chinese. Overthe period of time the email service in 22 languages will be offered by Data Xgen technologies.
5.	**Training**
	PradhanMantriGramin, Digital SakshartaAbhiyan, PMG Disha, Ongoing awareness campaign, reception within country and the outside world, criticism and impact.

C. RECOMMENDED STUDY MATERIAL:

S.No	Book	Author	Publication
a. Reference Books			
1.	Digital India: Understanding Information,Communication and Social Change	PradipNinan Thomas	SAGE
2.	Book on Digital India (Special Edition) by National e-governance mission, Government of India		
Important Web Links:			

1. https://economictimes.indiatimes.com/tech/internet/digital-india-15-salient-things-to-know-about-pm-narendra-modis-project/articleshow/47893380.cms
2. https://en.wikipedia.org/wiki/Digital_India
3. https://www.researchgate.net/publication/303643369_Digital_India_Objectives_Initiatives_and_Inherent_Challenges
4. https://digitalindia.gov.in/content/programme-pillars
5. https://www.civilserviceindia.com/subject/Essay/digital-india-or-green-india-discuss3.html

Code:MST03106 SMARTCITYDESIGN 4 Credits [LTP:4-0-0]

COURSE OVERVIEW AND OBJECTIVES:

The objective of the Smart Cities **Mission** is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and **application** of 'Smart' Solutions.

COURSE OUTCOME:

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

C03112.1 Understand the concept of smart city and smart energy business concepts.
CO03112.2 Apply governance of smart city by various techniques like Augmented Reality for City Planning.
CO03112.3. Understand the concept and characteristics of Smart City Intelligent Buildings and Urban Spaces.
CO03112.4 Understand the environmental and economic impacts on buildings by Multi-objective optimization.
CO03112.5 Apply the energy management and Smart City Distributed Energy.

A. OUTLINE OF THE COURSE

Unit No.	Title of the Unit	Time required for the Unit (Hours)

1.	Smart City Introduction And Concept	7
2.	Smart City Governance	8
3.	Smart City Intelligent Buildings And Urban Spaces	7
4.	Multi Objective Optimization- Smart City	7
5.	Smart City Distributed Energy	8

B. DETAILED SYLLABUS

Unit	Unit Details
1.	**Smart City Introduction And Concept**
	Smart City: local but networked, distributed but integrated Smart City, City monitoringandoperationsystemsVisionofanopensmartcityinteroperability environment Road maps for research and innovation policy Smart energybusiness concepts for Energy Hub districts Identifying development trends in smart city technologies – VTT Trend generator Public procurement of innovation for smart city solutions.
2.	**Smart City Governance**
	Real-time decision support systems for city management, Boosting collaborative planning with visualisation technology, Virtual Model Facilitating Citizen Interaction, Mobile Augmented Reality for City Planning, Co-creating future smart cities - Visual and participative urban planning services Citizen-driven co- design for a smarter city Social media for citizen participation Gamification as an enabler of mutual learning in complex health care systems Decision-making support: A smart city perspective
3.	**Smart City Intelligent Buildings And Urban Spaces**
	Intelligent buildings and urban spaces in smart cities Intelligent urban spaces– automatic real-time responses to people behavior Occupancy in smart buildings of smart cities – case hospital smart lighting Mobile augmented reality for building maintenance Autonomous management system for buildings and districts
4.	**Multi Objective Optimization- Smart City**
	Multi-objective optimization for the minimization of environmental and economic impacts on buildings at district level Intelligent Street lights adapt to conditions City mills leading the positive change in recycling.
5.	**Smart City Distributed Energy**
	Distributed renewable energy and energy management Highlights from the Smart Grids and Energy Systems programme. Active distribution networks with full integration of demand and distributed resources Integration of variable power generation into urban energy systems Future district heating solutions for residential districts Smart metering cyber security ICT for neighborhoods‟ energy management Energy-Hub for residential and commercial districts and transport ICT-supported business in energy positive neighborhood‟s Renewable energy and energy efficiency in new districts – how to accelerate systemic change towards smart cities Internet of Energy: Electric Mobility with Smart Grids.

C. RECOMMENDED STUDY MATERIAL:

S.No	Book	Author	Publication
a. Reference Books			
1.	Building smart cities-Analytics, design building and thinking	Carol l. Stimmel	Auerbach Publications
2.	Smart City- Foundation, principles and application	Houbing Song	JOHN WILEY
3.	Smart city and urban development of India	N. Mani	New Century Publications
b. Important Web Links:			
1.	https://nptel.ac.in/courses/105/105/105105160/		
2.	https://nptel.ac.in/courses/124/107/124107007/		
3.	https://swayam.gov.in/nd1_noc20_ce43/preview		
4.	https://www.youtube.com/watch?v=8G8ewFxE_V8		
5.	http://www.digimat.in/nptel/courses/video/105105160/L41.html		

Code:MOE03113	Renewable Energy	4 Credits [LTP:4-0-0]

COURSE OVERVIEW AND OBJECTIVES

The course should enable the students to : 1. Understand the various forms of conventional energy resources. 2. Learn the present energy scenario and the need for energy conservation 3. Explain the concept of various forms of renewable energy 4. Outline division aspects and utilization of renewable energy sources for both domestics and industrial application 5. Analyse the environmental aspects of renewable energy resources.

COURSE OUTCOME

The student would be able to

CO03113.1 Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations

CO03113.2 Know the need of renewable energy resources, historical and latest developments.

CO03113.3 Describe the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, desalination, power generation, drying, cooking etc

CO03113.4 Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.

CO03113.5 Understand the concept of Biomass energy resources and their classification, types of biogas Plants-applications

i. OUTLINE OF COURSE

Unit No.	Title of the unit	Time required for the Unit (Hours)
1	CLASSIFICATION OF ENERGY	**9**
2	APPLICATIONS OF SOLAR ENERGY	**10**
3	BIO ENERGY SOURCES	**8**
4	WIND ENERGY & SMALL HYDRO POWER SYSTEMS	**10**
5	OCEAN & GEOTHERMAL ENERGY	**7**

ii. Detailed Syllabus

Unit No.	Description
UNIT 1	**CLASSIFICATION OF ENERGY** Energy chain and common forms of usable energy- Present energy scenario-World energy status-Energy scenario in India - Introduction to renewable energy resources Introduction to Solar Energy-Energy from sun-Spectral distribution of Solar radiation- Instruments for measurement of solar radiation-Solar radiation data analysis
UNIT 2	**APPLICATIONS OF SOLAR ENERGY** Thermal applications -Introduction to Solar thermal collectors- Types - Principle of operation of different collectors - Flat plate- Evacuated tube collectors-Compound parabolic collectors- Solar air heaters - Solar dryers-solar cookers- solar stills - Solar ponds - concentrating collectors- line type - point type - Methods of Solar power generation - Power towers. Physics of solar cells - Cell and module Characteristics of cells and module - Performance parameters -BoS- PV System applications - Stand- alone- Grid connected systems
UNIT 3	**BIO ENERGY SOURCES** Energy through various processes - Energy through fermentation - Gasification - various types of gasifiers -Pyrolysis - Fixed bed and fast Pyrolysis - Bio energy through digestion - Types of Digesters-

	Factors affecting the yield of products
UNIT 4	**WIND ENERGY & SMALL HYDRO POWER SYSTEMS** Resource assessment - types of wind turbines - selection of components - blade materials - power regulation - various methods of control - wind farms - site selection - off shore wind farms - Solar Wind Hybrid energy systems. Introduction - types - system components, discharge curve and estimation of power potential- Turbines for SHP
UNIT 5	**OCEAN & GEOTHERMAL ENERGY** Power generation through OTEC systems - various types - Energy through waves and tides - Energy generation through geothermal systems - types

Code: MDCCEE3601 Discipline and Talent Enrichment Programme 2 Credits [LTP:2-0-0]

OVERVIEW AND OBJECTIVES:

The objective of Discipline and TEP is to provide students with the opportunities to enhance job fetching skills and at the same time to cultivate the student's personal interests and hobbies while maintaining the good disciplinary environment in the University. TEP is integrated into the curriculum for holistic development of students through active participation in various activities falling in Technical and non technical categories**.**

Discipline and Talent Enrichment Programme (TEP) shall be evaluated on the basis of its sub constituent programmes, as a complete **One credit** course. It shall be counted in calculation of SGPA but it is not a backlog subject. However, the attendance of these classes shall be recorded and accounted in the total attendance.

POORNIMA UNIVERSITY								
School of Engineering & Technology								
Name of Program: M. Tech. Power System, Batch: 2021 Onwards								
Teaching Scheme for Year – II, Semester- IV								
Course Code	Course Name	Teaching Scheme (Hrs per Week)			Marks Distribution			Credits
		Lecture (L)	Tutorials (T)	Practical (P)	IE	ESE	Total	
A.	University Core Courses							
A.1	Theory							
	-	-	-	-	-	-	-	-
A.2	Practical							
	-	-	-	-	-	-	-	-
B.	Department Core Courses							
B.1	Theory							
	-	-	-	-	-	-	-	-
B.2	Practical							
	-	-	-	-	-	-	-	-
C.	Department Elective: At least Two							
	-	-	-	-	-	-	-	-
D.	Open Elective: Anyone							
	-	-	-	-	-	-	-	-
E.	Humanities and Social Sciences including Management courses OR Ability Enhancement Compulsory Course (AECC)							
	-	-	-	-	-	-	-	-
F.	Skill Enhancement Courses (SEC) OR Project work, Seminar and Internship in Industry or Elsewhere							
MDCCEE4301	Dissertation Part-II	-	-	-	250	250	500	20
G.	Social Outreach, Discipline, TEP, VAC& Extra Curricular Activities							
MDCCEE4601	Discipline and Talent Enrichment Programme	-	-	-	50	-	50	1
	Total	-	-	-				21
	Total Teaching Hours							

The Project can be carried out in the Institution/Industry/Research laboratory or any other competent institutions.

Code: MPSCEE4601	Discipline and Talent Enrichment Programme	Credits [LTP:-0-0]

OVERVIEW AND OBJECTIVES:

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