The Course Structure of the MSc.T.E. (2 Yr) Programme

Semester	Courses distribution based on Credit			Total Credit
1st Sem	TVE Courses 9.00		Engineering Courses 6.00	15.00
2nd Sem	TVE Courses 9.00		Engineering Courses 6.00	15.00
3rd Sem	TVE Courses 6.00	Engineering Course (3-0)	Thesis (6.00)	15.00
4th Sem	Engineering Course (3-0)	Thesis (12.00)		15.00
Total:	TVE Courses 24.00 **40%**	Engineering Courses 18.00 **30%**	Thesis 18.00 30%	**60.00**

The Complete Course Structure of the MSc.T.E. (2 Yr) Programme

Semester	Courses							Total Credit
	1	**2**	**2**	**2**	**5**	**6**	**7**	
1st Sem	TVE Course (3-0)	TVE Course (3-0)	TVE Course (3-0)	TVE Course Non-Credit	Engineering Course (3-0)	Engineering Course (3-0)	Special studies (Non-credit)	15.00
2nd Sem	TVE Course (3-0)	TVE Course (3-0)	TVE Course (3-0)	TVE Course Non-Credit	Engineering Course (3-0)	Engineering Course (3-0)	Special studies (Non-credit)	15.00
3rd Sem	TVE Course (3-0)	TVE Course (3-0)	Engineering Course (3-0)	TVE 6000 Thesis (6.00)				15.00

4th Sem	TVE 6424 Seminar on Technical & Vocational Education (Non-credit)	Engineering Course (3-0)	TVE 6000 Thesis (12.00)	15.00
			Total	**60.00**

Engineering=30%, TVE (pedagogy/technical education)=40% and thesis=30%
**Non-credit: it is a practice-oriented course which students will not achieve any grade but it will be located in their final transcript. Respective teachers will assess this course and therefore teachers will be loaded contact hours as per rule.

TVE Courses for M. Sc. T.E. (2-year) Programme

Specialization: Any specialization

1st Semester (Any three courses as offered by the department from the following).

Course No.	Course Title	Contract Hours	Credit Hours
TVE 6113	Curriculum Development in Technical and Vocational Education	3.00	3.00
TVE 6125	Advanced Methods and Techniques of Teaching	3.00	3.00
TVE 6131	Information Technology in Technical Education	3.00	3.00
TVE 6151	Engineering Education Research Methods	3.00	3.00
TVE 6153	Educational Research	3.00	3.00
TVE 6155	Practicing Action Research in Technical and Vocational Education	3.00	3.00
TVE 6157	Action Research in Engineering Education	3.00	3.00
TVE 6171	Leadership and Management of TVET Institutions	3.00	3.00
TVE 6173	Adult Education	3.00	3.00
TVE 6175	Entrepreneurship Education	3.00	3.00

2nd Semester (Any three courses as offered by the department from the following)

Course No.	Course Title	Contract Hours	Credit Hours
TVE 6211	Philosophy of Technical Education	3.00	3.00
TVE 6213	Educational Psychology	3.00	3.00
TVE 6215	Advanced Educational Measurement and Evaluation	3.00	3.00
TVE 6219	Professional Development in Technical & Vocational Education	3.00	3.00
TVE 6221	Educational Finance	3.00	3.00
TVE 6233	Online Teaching and Learning	3.00	3.00
TVE 6253	Foundations of Engineering Education	3.00	3.00
TVE 6255	Professional Development in Engineering Education	3.00	3.00
TVE 6271	Educational Guidance and Counselling	3.00	3.00
TVE 6273	Management and Administration in Technical and Vocational Education	3.00	3.00

3rd Semester (Any two courses as offered by the department from the following)

Course No.	Course Title	Contract Hours	Credit Hours
TVE 6335	Emerging Issues in Educational Technology	3.00	3.00
TVE 6339	Administration and Supervision of Technical and Vocational Education	3.00	3.00
TVE 6353	Qualitative Research and Data Analysis	3.00	3.00
TVE 6355	Quantitative Research and Advanced Statistics	3.00	3.00
TVE 6357	Educational Planning	3.00	3.00
TVE 6371	Systems Approach in Technical Education	3.00	3.00
TVE 6375	Trends and Issues in Technical and Vocational Education	3.00	3.00

1st Semester (Compulsory, Non-credit)

Course No.	Course Title	Contract Hours
TVE 6126	Advanced Methods and Techniques of Teaching Lab	0-2

2nd Semester (Any one course as offered by the department from the following: Non-credit)

Course No.	Course Title	Contract Hours
TVE 6228	A practical course on Observation and Practice Teaching	0-3
TVE 6232	Information Technology in Technical Education lab	0-3

4th Semester (Compulsory, Non-credit)

Course No.	Course Title	Contract Hours
TVE 6424	Seminar on Technical and Vocational Education (TVE) for conducting research	0-3

Course Code TVE 6113 Curriculum Development in Technical and Vocational Education 3-0-0 Credit Hours 3.00

Contents: The meaning and concept of curriculum and its importance in education, foundations or determinants of curriculum; curriculum development process; objectives; content; methodology, evaluation; formulation of objectives; criteria and procedures of content selection; curriculum designs, curriculum implementation and instructional materials; curriculum evaluation; formative and summative evaluation; various models of curriculum evaluation.

Course Code TVE 6125 Course Title Advanced Methods and Techniques of Teaching

Course Hours 3-0-0

Contents: Introduction to teaching and learning; factors affecting learning; instructional objectives in terms of behavioral outcomes; writing learning objectives; Technical and Vocational Pedagogy; teaching methods in common use; their merits and demerits; teaching techniques; micro-teaching preparation and use of various instruction sheets; importance and use of audio-visual aids, characteristics of A.V. aids; lesson planning; steps and procedure for writing a lesson plan; evaluation techniques; discipline; safety and accident prevention.

Course Code TVE 6131 Course Title Information Technology in Technical Education

Credit Hours 3-0-0

Contents: Concept of using information technology (IT) in teaching-learning; Effective use and benefits of IT in Technical education (TE); Integration process of IT in TE; Describing available form of IT in TE, Power of Multimedia and the Internet; Attributes of IT; Successful technology-enhanced learning environment; Using videoconferencing, e-mailing and creating discussion forum for collaborative learning; Bridging virtual-learning and reality; IT and task-based teaching; Classroom discourse and interaction; Using IT to solve technical problems; Develop soft-skills through IT; Creating new IT through TE.

Course Code TVE 6151 Course Title Engineering Education Research Methods

Credit Hours 3-0-0

Contents: Current issues in engineering education research, Need of conducting research in engineering education; Major areas of conducting research and research questions; Literature reviews, Theoretical underpinning in engineering educational research; Qualitative, quantitative and mixed method research approaches; Research design, Measures of research quality; Ethical issues of conducting research.

Course Code TVE 6153 Course Title Educational Research

Credit Hours 3-0-0

Contents: Concept of educational research, need of research in technical education, Types of research, description and characteristics of different types of research; Research process - steps in conducting research, review of related studies and literature; Variables, hypothesis, sampling, Selecting and defining a problem; Describing methodology of research; Data

collection, analysis of data and its interpretation, use of descriptive statistics in interpreting data: Measures of central tendency dispersion and correlation. Preparing research proposals; Organizing / conducting research; Writing research report; Evaluating research.

Course Code TVE 6155 Course Title Practicing Action Research in Technical and Vocational Education

Credit Hours 3-0-0

Contents: Understanding of Action Research, A comparative thought of action research and traditional research, Historical and philosophical foundations of action research in TVE contexts; Benefits of action research, Planning action research in TVE context. Doing action research in the area of TVE: Steps, finding problems, define problem and clarifying a starting point; developing research questions, developing tools, collecting data, analyzing data and writing reports. Concluding an action research in descriptive and experimental methods and submission of reports.

(For this course no theoretical examination will take place. The students will be evaluated on the basis of the reports submitted by them and presentation of the reports)

Course Code TVE 6157 Course Title Action Research in Engineering Education

Credit Hours 3-0-0

Contents: Concept and purpose of action research in engineering education; Characteristics and principles of action research; Historical and philosophical foundations of action research in engineering education; Benefits of conducting action research, Planning action research in Engineering Education context. Conducting action research in the area of Engineering Education: major steps, finding problems, define problem and clarifying a starting point; developing research questions, developing tools, collecting data, analyzing data and writing reports. Concluding an action research in descriptive and experimental setting; Action research reports and performance evaluations; Ethics of conducting action research; Ways to implement actions after research.

Course Code TVE 6171 Course Title Leadership and Management of TVET Institutions

Credit Hours 3-0-0

Contents: Leadership and improvement of TVET institutions; Models of educational leadership and linking the models to leadership development; The significance of leadership and management for development of TVET sectors: the expanded role of leaders towards development of TVET institutions; Preparing and supporting leaders in OIC member countries: leadership succession, leadership preparation leadership training and development; The impact of leadership development: Evaluating the impact of leadership development.

Course Code TVE 6173 Course Title Adult Education

Credit Hours 3-0-0

Contents: Introduction to Adult Education; Learning Specialties of Adults- Learning prerequisites, Learning design, Learning behavior; Didactic principles in teaching learning design for adults perspective of didactic principles, different types of didactic principles for adults; Support of active teaching/learning process for adults development of activities

through motivation, development of self confidence in teaching/learning, perceptions of (self-) controlling of adults.

Course Code TVE 6175 Course Title Entrepreneurship Education

Credit Hours 3-0-0

Contents: Concept of entrepreneur and entrepreneurship; Need and scope of entrepreneurship through TVE; Growth of entrepreneurships; TVE and entrepreneurship; Entrepreneurship educations; Discuss successful models (examples) of entrepreneurship in TVE sectors; Principles and ingredients of successful entrepreneur; Distinction between entrepreneur and manager; Role of TVE to create ventures; Methods of developing entrepreneurial qualities and skills; Barriers to entrepreneurship for TVE graduates. Developing new models for introducing entrepreneurships in TVE contexts.

Course Code TVE 6211 Course Title Philosophy of Technical Education

Credit Hours 3-0-0

Contents: Meaning and concept of Philosophy. Theories of Education: Perennialism, Essentialism, Progressivism and Reconstructionism. Philosophical models of teaching, Practice at work and informal learning, Role of Philosophy in Technical Education. Analyzing current research in philosophical perspectives.

Course Code TVE 6213 Course Title Educational Psychology

Credit Hours 3-0-0

Contents: Educational psychology – nature, scope and importance; Heredity and environment; Physical, social and emotional development; Motivations and class arrangement, fulfilment of motives; Learning, transfer of learning; Intelligence – its nature, growth and measurement; Personality; Adolescence; Mental hygiene – its nature and scope, adjustment, conflicts and mental disorders; Therapies – their nature and types; Group dynamics.

Course Code TVE 6215 Course Title Advanced Educational Measurement and Evaluation

Credit Hours 3-0-0

Contents: Evaluating student progress; principles of measurement evaluation; scales of measurement; tests as measuring instruments; nature of psychological entities measured by tests; assessment of goodness of tests as measuring instruments; types of validity, reliability and usability of tests; tests as samples of behaviour; inferences involved in constructing and applying tests for measurement; planning the test specification of objectives in test construction plan; types of test items; item construction; item analysis- difficulty and discrimination indexes, interpretation of test scores, standardization and norms; measurement of abilities achievement, aptitudes, intelligence. Evaluating affective behaviours - evaluation methods based on observation, sociometric and related techniques, self report inventories, protective techniques; testing Programmemes and problems in the OIC countries.

Course Code TVE 6219 Course Title Professional development in technical and vocational education

Credit Hours 3-0-0

Contents: The Essential role of Professional Development (PD) in technical and vocational education (TVE); Professional Development designed to change teaching and learning; Plan for PD Programme for TVE teachers; PD focusing on different activities: designing and planning instructions, managing classroom activities, constructing effective assessment and evaluation techniques; Using technology-focused, student-focused and industry-focused teaching perspective to align PD.

Course Code TVE 6221 Course Title Educational Finance

Credit Hours 3-0-0

Contents: Concept of Educational Finance; Need and significance of Educational Finance; Principles of educational finance: General theory of educational finance, Reasons of educational finance; Role of following bodies in financing Education in OIC countries: Central government, State Governments, Local Bodies, Private agencies, Voluntary Organizations; Sources of Finance; Economics of Educational System; Cost of Education; Educational Expenditure; Institute/ University Budget: Budget making process, Evaluation, Planning a school budget in relation to govt., grants, resources from the society, tuition fees, donations and local endowments etc. Some problems and issues of Educational Finance: Tuition fees: Merits and demerits of uniform, tuition fees, Additional resources for education, Critical review of present grant-in-aid policy of the state government with special reference to secondary education, The factors affecting increasing the financial burden on local governments, Ways and means of controlling funds.

Course Code TVE 6233 Course Title Online Teaching and learning

Credit Hours 3-0-0

Contents: Importance of online teaching; Strength and limitation of online teaching; Types of online learning environments: Institutionally supported technologies, open technologies; issues consider when planning online class; Useful planning strategies for online learning; Designing online activities; how to use online resources; Strategies for motivating students and sustaining participation and engagement in learning through online; Evaluation strategy in online teaching.

Course Code TVE 6253 Course Title Foundations of Engineering Education

Credit Hours 3-0-0

Contents: Educating the engineer of new era: Adapting engineering education to the new century, Visions of engineering in the new century; Engineering for a changing World: A roadmap to the future of engineering, Learning in Groups and Teams in engineering education context; Quality learning for engineering work settings; Interdisciplinary approach and research in engineering education; International standards and accreditations of engineering education; Quality frameworks of engineering educations in private and public institutions; Role of engineering education for human resource developments and poverty reductions. Problems and prospects confronting by engineering education in the OIC countries.

Course Code TVE 6255 Course Title Professional development in engineering education

Credit Hours 3-0-0

Contents: The Essential Role of Professional Development (PD) in engineering education; Professional Development designed to change teaching and learning; Plan for PD Programme

in engineering education; PD focusing on different activities: designing and planning instructions, managing classroom activities, constructing effective assessment and evaluation techniques; Using a student-focused learning perspective to align PD; Professional development: current researchers perspectives.

Course Code TVE 6271 Course Title Educational Guidance and counselling

Credit Hours 3-0-0

Contents: Definition, nature and scope of guidance; principles and basic concepts of guidance; importance of guidance and counselling in vocational and technical institutions; need assessment for guidance; distributive and adjective guidance and their components; relationship of guidance with curricular and extracurricular activities of the school; guidance and counselling tools and techniques tests, interest blanks, cumulative records, inventories, rating scales and case study; guidance Programmeme in school and its organization, management and administration; placement services; guidance personal and their responsibilities.

Course Code TVE 6273 Course Title Management and Administration in Technical and Vocational Education

Credit Hours 3-0-0

Contents: Meaning and development of management and administration; Unique aspects of educational administration; Organization and management, organizational design in TVE Institutions; Administrative tasks; Work of educational administrators; administrators, administrative process and the educational administrators, characteristics of managerial work; leadership and management, concept of academic leadership in TVE; Team building and motivation; Role of TVE personnel in management and administration; Administrative behavior and educational administration; supervision, management of change; challenge of administration.

Course Code TVE 6335 Course Title Emerging Issues in Educational Technology

Credit Hours 3-0-0

Contents: Emerging, current and historical issues in educational technology; Choice and challenges of integrating emerging technologies into higher education; Emerging tools for enhancing teaching and learning: how to design, assessing students learning, motivational techniques, key strength and weakness. Learning analytics and strategies for using learning analytics.

Course Code TVE 6339 Course Title Administration and Supervision of Technical and Vocational Education

Credit Hours 3-0-0

Contents: Meaning and components of administration, general administration vs. educational administration; administrative process; historical development of administration; scientific management, human relations approach, behavioral approach, systems approach; administrative tasks; leadership; leadership theories and styles; motivation and motivational theories; personnel administration; nature and types of supervision of instruction; characteristics of supervision.

Course Code TVE 6353 Course Title Qualitative research and data analysis

Credit Hours 3-0-0

Contents: Qualitative research, its relevance, history and theoretical positions, construction and understanding of texts; Research designs: process and theories, research questions, entering the field, sampling strategies. Verbal data: Semi structured interviews, narratives as data, focus group interviews and discussions, an overview of verbal data. Visual data: Observation, ethnography and visual data methods, an overview of visual data. From text to theory: Documentation of data, coding and categorizing, sequential analyses, an overview of text interpretation, grounding qualitative research, writing qualitative research. Recent and further developments: Computer in qualitative research, qualitative and quantitative research, and the quality of qualitative research.

Course Code TVE 6355 Course Title Quantitative research and advanced statistics

Credit Hours 3-0-0

Contents: Methods of Educational Research, Quantitative research and its focus and importance; Different types of quantitative research: Descriptive, Experimental and Experimental Design and other emerging research in quantitative paradigm; Sampling, testing experimental hypothesis, determination of sample size, Tools of Research, Parametric tests, testing statistical significance; z - test, t - test, Analysis of Variance, Nonparametric tests: Sign test, Man Whitney U test; c2 - test, Median test. Use of statistical techniques in the behavioural science.

Course Code TVE 6357 Course Title: Educational Planning

Credit Hours 3-0-0

Contents: Educational planning – definitions and terminology; Different approaches to educational planning; The role of targets in educational planning; Cost analysis in educational planning; The planning process; Constraints on educational planning.

Course Code TVE 6371 Course Title Systems Approach in Technical Education

Credit Hours 3-0-0

Contents: Definition of a system; the systems approach for assessment and improvement of operations; subsystems; organizations, and interdisciplinary studies; objectives and their choice; operations research in the study of systems; use of computers in systems analysis; decision models, matching problems of systems that include men and computers; quantifiable parameters of group performance, reliability as a parameter; evolutionary design of complex systems; relations between human engineering, operations research and systems engineering; application of the systems approach for assessment, analysis, management and improvement of education systems.

Course Code TVE 6375 Course Title Trends and Issues in Technical and Vocational Education

Credit Hours 3-0-0

Contents: Concept, nature and scope of technical and vocational education, concepts of trends and issues. Major issues and trends in technical and vocational education; technical and vocational education's International context, cooperation between technical and vocational

education institutions and the world of work, professional preparation of teachers; major trends and issues in curriculum development, significance of vocational education in fostering social, economic, and educational values in a democratic society, current trends in policy planning and management of technical and vocational education and training, financing in TVE. Recent trends in research and development of TVE.

Non-credit Subject

Course Code TVE 6127 Course Title Advanced Methods and Techniques of Teaching Lab

Contents: The Lab practice will be conducted based on the theories of TVE 6125. Therefore, this practice work is linked with the learning objectives of TVE 6125.

Course Code TVE 6228 Course Title A practical course on Observation and Practice Teaching

Contents: Teacher will provide a demonstration on the practical role of a teacher; teaching practice in the micro teaching lab; preparation for teaching a specialized subject. Students will observe engineering classes to get insight about how to deliver effective teaching.

Course Code TVE 6232 Course Title Information Technology in Technical Education lab

Contents: Teacher will show the practical role of a teacher by using technology in the blended and online contexts; showing the possibilities of using different tools in the blended and online contexts.

Course Code TVE 6424 Course Title Seminar on Technical and Vocational Education (TVE) for conducting research

Contents: Research students need to share and exchange their views and ideas in the form of research proposal on TVE in this seminar. Thereafter, they need to present their own research report (draft).

EEE Courses for M.Sc.T.E. (2-year) Programme

Specialization: Electrical and Electronic Engineering

1st Semester (Any two courses as offered by the EEE Department. Some of the lists are as follows. Priority will get from following lists:)

Course No.	**Course Title**	**Contract Hours**	Credit **Hours**
EEE 6191	Analysis and Synthesis of Circuits	3.00	3.00
EEE 6193	Electric and Magnetic Properties of Materials	3.00	3.00
EEE 6195	Modern Control Theory	3.00	3.00
EEE 6197	Applied EM Theory	3.00	3.00
EEE 6199	Solid State Devices	3.00	3.00

2nd Semester (Any two courses as offered by the department)

Course No.	Course Title	Contract Hours	Credit Hours
EEE 6291	High Voltage Engineering	3.00	3.00
EEE 6293	Power System Stability	3.00	3.00
EEE 6295	Advanced Electronics	3.00	3.00
EEE 6297	Microwave Engineering	3.00	3.00
EEE 6299	Microwave Theory and Tech.	3.00	3.00

3rd Semester (Any one courses as offered by the department)

Course No.	Course Title	Contract Hours	Credit Hours
EEE 6391	Engineering Analysis	3.00	3.00
EEE 6393	Energy Conversion	3.00	3.00
EEE 6395	Advanced Machine Design	3.00	3.00
EEE 6397	Statistical Theory of Communication	3.00	3.00
EEE 6399	Telephone Traffic Theory	3.00	3.00

4th Semester (Any one course as offered by the department)

Course No.	Course Title	Contract Hours	Credit Hours
EEE 6491	Generalised Machine Theory	3.00	3.00
EEE 6493	Optimization of Power System Operation	3.00	3.00
EEE 6495	Computer Aided Power System Design	3.00	3.00
EEE 6497	Transients in Power Systems	3.00	3.00
EEE 6499	Laser Theory and Optical Communication	3.00	3.00

1st Semester (Compulsory, Non-credit)

Course No.	Course Title	Contract Hours
EEE 6190	Special Studies[1] (Non-credit)	0-0-4

2nd Semester (Compulsory, Non-credit)

Course No.	Course Title	Contract Hours
EEE 6290	Special Studies (Non-credit)	0-0-4

[1] It is a practice-oriented course which students will achieve grade either S: 'Satisfactory, U: 'Unsatisfactory' or I: 'Incomplete' and it will be located in their final transcript. Respective teachers will assess this course and therefore teachers will be loaded contact hours as per rule.

EEE Courses for M. Sc. T.E. (2-year) Programme
Specialization: Electrical and Electronic Engineering

Course Code EEE 6191 Course Title Analysis and Synthesis of Circuits

Credit Hours 3-0-0

Introductory network concepts. Definitions and symbols. Sign convention. Terminals and ports. Network functions. Complex frequency, driving point and transfer functions. Representation by poles and zeros. Properties of network function. Properties of Immittance function; Positive real function. Hurwitz Polynomials, Natural frequencies of network; Parts of a network function. (Magnitude and phase plots, Bode and Nyquist diagrams). Minimum phase transfer function. Calculation of a network function from prescribed real part. Imaginary part. Magnitude or phases. Synthesis of two element; Kind-one port LC, RC and RL one port network.

Two port networks. Classification and characterization of two ports. Two port parameters and natural frequencies. Interconnections of two ports. Common two port configuration. Scattering parameters. One end parameters; Iterative and Image Parameters. Filters; Type of filters. Frequency and impedance scaling. Image parameter. Filters; Design frequency transformation. Butterworth and Schebychev response. Insertion loss. Methods of net-work analysis. Block diagrams. Signals flow graphs, State variable techniques. Lattice networks. Bartletts bisection theorem. Synthesis of Lattice network. Unbalancing of Lattice networks transmission characteristic. Signal distortions. Relationship between bandwidth and rise time, and between delay time and net-functions.

Course Code EEE 6193 Course Title Electric and Magnetic Properties of Materials

Course Hours 3-0-0

Contents: Atoms and aggregates of atoms; Crystals, waves in crystals; Schro-dinger wave equation, Quantum statics; Conductivity theory; Collision theory and conductivity of metals; Conductors; Carrier transport theory, P.N. Junction photo cells; Solar cells; Tunneling principles, Dielectric; polar and non-polar dielectrics; Langevin function, Clausius- Mossotti Equation, Ferro-electricity.

Magnetic properties of materials; Magnetic moment; Domain wall motion and coercive force in crystals; Polycrystalline and permanent magnetic materials; Magnetic resonance; Testing of magnetic materials; Super conductivity. Quantum electronics.

Course Code EEE 6195 Course Title Modern Control Theory

Credit Hours 3-0-0

Contents: General Introduction; State space concept: System design by State – Transition method concept of controllability and observability. Optimal control- variational calculus method; Principle of maximum and dynamic Programmeming. Stochastic and adaptive control processor, On line computer control.

Vector norms; induced operator norms; Lp stability; the small grain theorem; performance/robustness trade-offs; L1 and Hoo optimal P control as operator norm minimization; H2 optimal control.

Course Code EEE 6197 Course Title Applied EM Theory

Credit Hours 3-0-0

Contents: Generalized approached to field theory: Introduction to reaction concept; Wave propagation through isotropic, anisotropic and gyrotropic media. Scattering of EM waves.

Antenna theory; application of Maxwell's equations to determine electromagnetic fields of antennas; radiation, directional arrays, impedance characteristics, aperture antennas; application of reaction concept and variational principles in antennas and propagation. Advance topics in EM Theory.

Course Code EEE 6199 Course Title Solid State Devices

Credit Hours 3-0-0

Solid State Diodes and Triodes: Visible and infrared LED, principle, material, construction. Photodetectors: photoconductor, junction photodiode, p-I-n photodiode, avalanche photodiode.
Solid state microwave devices, integrated electronic circuits: MOS transistor characteristics, NMOS and CMOS inverters.

Course Code EEE 6291 Course Title High Voltage Engineering

Credit Hours 3-0-0

Contents: High voltage supplies: A.C.: Cascaded Transformers. Tesla Coils; D.C: Valve Rectifier Circuit, Cascaded Rectifiers. Electrostatic Generators:

Van-de-Graaff generators. Corona; Power loss calculations. Breakdown of solid, liquid and gaseous dielectrics. Insulation tests. Standard specification.

Impulse generators. Impulse wave shapes. Mathematical analysis and design consideration of impulse generators. Triggering of Impulse generators; Measurement of high voltages. Transmission Line design based on direct strokes, Insulation Coordination. Lightning arresters and protector tubes.

Course Code EEE 6293 Course Title Power System Stability

Credit Hours 3-0-0

Contents: The stability problem of power system. Distinction between steady state and transient stability. The Swing equation and its solution. Solution of networks for stability studies. Transient stability limits criteria. Two machine and multimachine problems. Stability under different types of faults. Typical stability studies and methods of improving stability. The influence of swinging and out-of step operation upon protective relays. Rapid reclosing for improving stability.

Course Code EEE 6295 Course Title Advanced Electronics

Credit Hours 3-0-0

Designing Linear and nonlinear electronic circuits with operational amplifiers, Survey of available op-amps, Amplifications and limitations. Applications in Communication and instrumentation. Application of digital IC's in Communication circuits. Survey of logic

families (TTL, ECL, CMOS, etc.) and their suitability for different applications. Design of Active filters, digital filters.

Course Code EEE 6297 Course Title Microwave Engineering

Credit Hours 3-0-0

Contents: H.F. Transmission lines; Smith chart: Impedance matching and applications. E.M. Wave propagation. Reflection and refraction. Wave guides: Parallel plane, rectangular, coaxial wave guides.

Transit time effects; Velocity modulation; Space charge wave; Microwave tubes; Klystron, Magnetron, Travelling Wave Tube Amplifier. Wave guide components. Cavity resonators. Antennas and radiation. Hertzian dipole. Long antenna analysis Radiation patterns, Rhombic and slot antenna. Antenna arrays. Introduction to antenna array design.

Course Code EEE 6299 Course Title Microwave Theory and Tech.

Credit Hours 3-0-0

Contents: Microwave oscillators and amplifiers: Principles of generation of millimeter and sub-millimeter waves; Detailed analysis of Klystrons, Magnetrons and TWT amplifiers and backward wave oscillators. Harmonic generators, Guun-effect devices. Microwave Circuits: Microwave network analysis and synthesis. Matrix representation and scattering matrix. Analysis of waveguide discontinuation obstacles, junctions and cavities and strip lines. Methods of microwave precision measurements.

Course Code EEE 6391 Course Title Engineering Analysis

Credit Hours 3-0-0

Contents: Professional methods of dealing with problems in Electrical and Electronic Engineering. Mathematical and Physical principles applied to problems of diverse topics. Linear spaces, N-dimensional and infinite dimensional vector spaces. Spectral Theory of Linear operators and their applications, Grem's function and function concept and solution of engineering problems, variational methods. Simulation and optimization techniques. Statistical methods with application in electrical and electronic engineering.

Course Code EEE 6393 Course Title Energy Conversion

Credit Hours 3-0-0

Contents: Energy Conversion Processes: General introduction, energy sources, renewal and non-renewal energy sources, principle of conservation of energy, energy balance equations; Total energy concept. Direct Electrical Energy Conversion: Introduction; Magneto-hydrodynamic (MHD); Fuel Cell; Thermo-electric, Ferro-electric electrostatic and Piezoelectric energy conversions; characteristics including efficiency, power densities, terminal properties and limitations.

Solar energy, Bulk power generation ; Photo – electric and photo – voltaic, Solar Cell, Construction, characteristics including efficiency, applications and limitations. Electromechanical energy conversion: General introduction of Electrical to Mechanical, Mechanical to Electrical, Electrical and Electrical convention ; Bulk energy conversion devices; General formulations of equations; Coordinate transformation and terminal characteristics.

Course Code EEE 6395 Course Title Advanced Machine Design

Credit Hours 3-0-0

Contents: General Treatment of Electrical Machine Design. Review of standard procedures in design of D.C. Machines, A.C. Machines, transformers and special machines, Optimization and synthesis of design procedures. Application of material balance and critical path principles in electrical design. Design economics and safety factors. Applications of computers in modern designs including the operation of the machine in non-linear ranges; Magnetic flux-plots and heat transfer process, etc. Mechanical Design of Electrical Machinery and relation between Mechanical and Electric Machine Design.

Course Code EEE 6397 Course Title Statistical Theory of Communication

Credit Hours 3-0-0

Contents: Periodic and random signals. Stationary random processes.

Elements of probability theory. Statistical Characteristics of messages and noise, Autocorrelation: Cross-correlation and spectral analysis. Determination of correlation functions and separation of signals from noise.

Application of correlation techniques. Optimum filter, prodictor, etc. Synthesis of optimum linear systems.

Course Code EEE 6399 Course Title Telephone Traffic Theory

Credit Hours 3-0-0

Contents: Introduction, Electronic switching: Basic switching system, Evolution of modern switching systems. Types of switching systems; Stored Programme control (SPC), centralized SPC and distributed SPC. Basic time division switching, time slot inter change, time multiplexed time switch.

Nature of telecommunication traffic; Full availability; Limited availability and link system; Lost call cleared theory; Lost call held theory; Non-blocking networks; Characteristics of telecommunication network planning; Traffic measurement, Traffic prediction; Traffic simulation.

Course Code EEE 6491 Course Title Generalised Machine Theory

Credit Hours 3-0-0

Contents: Introduction to generalized machine theory. Kron's Primitive machine; Moving to fixed-axis transformation; Parke's transformation; Three-phase to d-q transformation; Variable co-efficient transformation, other transformation; Matrix and tensor analysis of machine, Three-phase synchronous and induction machine; Two-phase servo motors; Single-phase induction motor. Smooth-motor two phase double excited machine; Smooth-air gap two-phase synchronous machine. Two-phase induction machine. The n-m winding symmetrical machine; diagonalisation by a change of variable; Symmetrical three phase machine and special limiting cases.

Course Code EEE 6493 Course Title Optimization of Power System Operation

Credit Hours 3-0-0

Contents: General principles of optimization, its application to power system planning, design and operation. Probability analysis for bulk power security and outage data. Economic operation of power system-economic operation of thermal plants, combined thermal and

hydro-electric plants. Theory of economic operation of inter connected areas. Development and application of transmission loss formulae for economic operation of power systems. Methods of optimum scheduling and dispatch of generation.

Course Code EEE 6495 Course Title Computer Aided Power System Design

Credit Hours 3-0-0

Contents: General review of network and matrix theories. Algorithms for formation of network matrices. Three- phase networks flux-linkage calculations, line parameter calculations, short-circuit calculations, load flow studies, system stability studies, prediction of reliability, over voltages and relay coordinations.

Course Code EEE 6497 Course Title Transients in Power Systems

Credit Hours 3-0-0

Contents: Transients in simple electric and magnetically linked circuits; Fundamentals. Impacts of Switching on rotating machinery. Parallel operation of interconnected networks; Distribution of Power impacts. Interaction of Governor's in power systems. Overvoltage during power system faults. Systems voltage recovery characteristic. Effect of arc restriking on recovery voltage. Switching surges and overvoltage arrester requirements. Over voltages caused by sudden loss of load and by open conductor.

Course Code EEE 6499 Course Title Laser Theory and Optical Communication

Credit Hours 3-0-0

Contents: Quantum Electronics applied to electronic energy level transitions. Classical radiation and absorption by electronics. Narrow band spectra of solids; III-V compound material technology. Spontaneous and stimulated emission in lasers; optical wave guiding equation solutions, quantum noise and spectral linewidth properties of lasers; Principles of Gaseous and solid state Laser devices. Laser rate equations. Principle and structure of photodiodes, Theory of Fiber optics. Fiber types and characteristics. Light sources: light emitting diode and laser diode. Detectors: PIN and avalanche photodetectors. Receiver analysis: direct detection and coherent detection, noises and limitations. Transmission limitations: chromatic dispersion, nonlinear refraction, scattering, four wave mixing, laser phase noises. Optical amplifier: laser and fiber amplifiers. Multichannel optical system: frequency division and wavelength division multiplexed systems.

Non-credit Subject

Course Code EEE 6190 Course Title Special Studies

Contents: The students are required to undertake a mini project in the field of electrical and electronic engineering in their respective specialization. The objective is to provide an opportunity to the students to develop initiative, creative ability, confidence and engineering judgement. The results of the work should be submitted in the form of a report which should include approximate drawings, charts, tables, references etc.

Course Code EEE6290 Course Title Special Studies

Contents: The students are required to undertake a mini project in the field of electrical and electronic engineering in their respective specialization. The objective is to provide an opportunity to the students to develop initiative, creative ability, confidence and engineering judgement. The results of the work should be submitted in the form of a report which should include approximate drawings, charts, tables, references etc.

MCE Courses for M. Sc. T.E. (2-year) Programme
Specialization: Mechanical Engineering

1st Semester (Any two courses as offered by the MCE Department Some of the lists are as follows. Priority will get from following lists:)

Course No.	**Course Title**	**Contract Hours**	Credit **Hours**
MCE 6191	Mechanical Behaviour of Engineering Materials	3.00	3.00
MCE 6193	Intermediate Fluid Mechanics	3.00	3.00
MCE 6195	Advanced Production Processes	3.00	3.00
MCE 6197	Advanced Machine Tools	3.00	3.00
MCE 6199	Corrosion Engineering	3.00	3.00

2nd Semester (Any two courses as offered by the department)

Course No.	Course Title	Contract Hours	Credit Hours
MCE 6291	Thermal Environmental Engineering	3.00	3.00
MCE 6293	Heat Transfer Equipment design	3.00	3.00
MCE 6295	Plastics Process Engineering	3.00	3.00
MCE 6297	Designing for Production	3.00	3.00

3rd Semester (Any one course as offered by the department)

Course No.	Course Title	Contract Hours	Credit Hours
MCE 6393	Advanced Heat Transfer	3.00	3.00
MCE 6395	Quality Assurance	3.00	3.00
MCE 6397	Operations Research	3.00	3.00
MCE 6399	Mass Transfer	3.00	3.00

4th Semester (Any one course as offered by the department)

Course No.	Course Title	Contract Hours	Credit Hours
MCE 6491	Applied Elasticity	3.00	3.00
MCE 6493	Classical Thermodynamics	3.00	3.00
MCE 6495	Production Management	3.00	3.00
MCE 6497	Engineering Economics	3.00	3.00

1st Semester (Compulsory, Non-credit)

Course No.	Course Title	Contract Hours
MCE 6190	Special Studies[2] (Non-credit)	0-4

2nd Semester (Compulsory, Non-credit)

Course No.	Course Title	Contract Hours
MCE 6290	Special Studies (Non-credit)	0-4

[2] It is a practice-oriented course which students will achieve grade either S: 'Satisfactory, U: 'Unsatisfactory' or I: 'Incomplete' and it will be located in their final transcript. Respective teachers will assess this course and therefore teachers will be loaded contact hours as per rule.

MCE Courses for M.Sc.T.E. (2-year) Programme
Specialization: Mechanical Engineering

Course Code MCE 6191 Course Title Mechanical Behaviour of Engineering Materials

Credit Hours 3-0-0

Contents: Elastic and plastic behaviours in tension, compression, shear, bending and combined stresses. Cost, availabilityand characteristics of engineering materials. Ductile fracture, initiation and onduc, Brittle fracture, crack formation and crack onduc, Griffith's law of crack propagation. Creep mechanism, creep tests. Low and high temperature properties. Fatigue properties, mechanism of fatigue tests

Course Code MCE 6193 Course Title Intermediate Fluid Mechanics

Course Hours 3-0-0

Contents: Compressible flow through ducts of varying and uniform cross section. Potential flow, velocity potential and stream function, examples of ideal two dimensional steady flow. General continuity and Navierstokes equations, flow regimes and simple flow solutions, flow through passages, universal velocity distribution, flow over immersed bodies, boundary layer analysis.

Course Code MCE 6195 Course Title Advanced Production Processes

Credit Hours 3-0-0

Contents: Selection of production processes, selection of machine tools, economics of jigs and fixtures. Different welding processes; unconventional welding technique; effects of welding on metal structure; design and joint preparation, testing of welded joints. Ferrous and non-ferrous casting; different types of iron castings; die casting investment casting and shell molding, principles of metal forming; metal forming processes; design of pressworking tools. Principles of manufacturing components from powdered material; capabilities and limitations of centered products.

Course Code MCE 6197 Course Title Advanced Machine Tools

Credit Hours 3-0-0

Contents: Machine tool classification; selection criteria and acceptance tests; kinematic structure. Gear manufacturing machine tools; machine tools for cutting tools production; Automatic and semi-automatic machine tools;

Static and dynamic rigidity of machine tools.

Course Code MCE 6199 Course Title Corrosion Engineering

Credit Hours 3-0-0

Contents: Principles and applications of modern theory of corrosion. Pourbaix diagrams. High temperature corrosion. Corrosion in specific chemical processes and other industries, e.g., pollution control, waste treatment, coal conversion, desalination, aerospace, corrosion of surgical implants in human body. Methods and economics of corrosion proection. Uses of non-metallic materials.

Course Code MCE 6291 Course Title Thermal Environmental Engineering

Credit Hours 3-0-0

Contents: Fundamentals of refrigeration, vapour compression refrigeration system, absorption refrigeration system, cryogenics and others refrigeration systems, psychrometry, Evaporative cooling. Heating and cooling of most air. Solar radiation and heat transfer in buildings. Air conditioning systems. Air handling and distribution systems.

Course Code MCE 6293 Course Title Heat Transfer Equipment

Credit Hours 3-0-0

Contents: Contents: Review and study of related theories of heat, mass and momentum transfer: Heat Conduction; Heat Conduction-Rectangular and cylindrical Coordinates; Convective Heat Transfer: Forced convection, natural convection, transport equations, Transport in rarefied gases. Condensation and evaporation, convective mass transfers. Different types of heat transfer equipment, fouling. Analysis and design of heat transfer equipment.

Course Code MCE 6295 Course Title Plastics Process Engineering

Credit Hours 3-0-0

Contents: Introduction, Classification of Polymers, Molecular Weight Distribution, Polymerization, Co-polymerization. Additives and Compounding, Properties of plastics, Processing of Plastics, Extrusion: Basic Single Screw Extruder, Screw parameters, Material Characteristics, Principles of Die design. Complete Extrusion Process: Pipe, Film, Solid section, Monofilament, Wire Coating, Multiscrew Extruders. Injection Molding: Construction and Operation, Screw Design, Specification. Clamping system, Calculation of clamping force; Hydraulic system. Injection Mould and Materials, Control systems. Blow, Compression, Transfer Moulding. Calendering. Forming: Vacuum, Thermo. Glass Reinforced plastics; Identifications of Plastics.

Course Code MCE 6297 Course Title Designing for Production

Credit Hours 3-0-0

Contents: Product specification formulation; customer's requirement, alternative solutions and their evaluation, Design considerations; function appearance, economy. Design methods; economic factors of design; general design rules, Tolerances; achieving large machining tolerances; effect of tolerance on product cost. Design features to facilitate machining tolerances; effect of tolerance on product cost. Design features to facilitate machining; functional and manufacturing datum faces. Component design considerations-casting, welding, machining, assembly and material standardisation in product design.

Course Code MCE 6393 Course Title Advanced Heat Transfer

Credit Hours 3-0-0

Contents: General conduction quation for anisortropic solids. Steady and unsteady conductio, analytical and numerical analysis of rings of non-uniform cross-section. Thermal radiation, heat exchange among gray bodies. Forced and natural convection, energy equation, external and internal flows, analytical and experimental results. Condensation and evaporation.

Course Code MCE 6395 Course Title Quality Assurance

Credit Hours 3-0-0

Contents: Quality assurance functions, relationship to reliability. Organization of Quality assurance, Systems and Procedures, Motivation and Quality control. Quality audit; systems, procedures and organisation of audit, Control of Engineering quality, Control of quality during manufacture.

Course Code MCE 6397 Course Title Operations Research

Credit Hours 3-0-0

Contents: Basic statistical concepts, Probability and reliability concepts. Confidence limit. Theory of sampling and sampling plans, sampling inspection. Linear Pogramming; general linear Programmeming models. Scheduling; Network analysis, simulation.

Course Code MCE 6399 Course Title Mass Transfer

Credit Hours 3-0-0

Contents: Study of mass transfer operations. Topics will include phase equilibria, molecular and turbulent diffusion, mass transfer coefficients and transfer units, theories of mass transfer, column hydrodynamics, plate efficiency, Mlticomponent systems.

Course Code MCE 6491 Course Title Applied Elasticity

Credit Hours 3-0-0

Contents: Stress and strain tensor, equations of equilibrium, compatibility, generalized Hook's law, Airy's stress function, Formulation of elasticity problems, St. Venant's principle, superposition, stress concentrations, axisymmetric problems, rotating discs and cylinders. Thermal stresses; three dimensional progblems. Xtension, flexure, torsion, Reciprocal theorems; energy principles and variational methods.

Course Code MCE 6493 Course Title Classical Thermodynamics

Credit Hours 3-0-0

Contents: Macroscopic and Microscipic point of view, Temperature cocept. Thermodynamic systems. Work, quasi-static process. First law and second law of thermodynamics, Reversibility and irreversibility, entropy. Properties of pure substances, equations of state. Applications of thermodynamics, to pure substances and special systems, Equilibrium and stability.

Course Code MCE 6495 Course Title Production Management

Credit Hours 3-0-0

Contents: Production organisations, organisation structure according to type of product, Systems engineering applied to production systems and organisations. Operational sub-systems. Factory Planing; concept; location, plant layout, layout of production equipment; material handling, Operation Research techniques for management decision. Human influences on productivity. Role of union. Collective bargaining, wage incentive plans.

Course Code MCE 6497 Course Title Engineering Economics

Credit Hours 3-0-0

Contents: Investment cost, evaluation of investment proposals, capital budgeting. Capital recovery methods, compound interest concept, present worth factor, sinking fund, cost of boroowed money. Cost concepts, elements of production cost, economic lot sizes, profit, nature and measurement of profit, break-even point, princing products. Demand theory, method of forecasting demand, Replacement of assets.

Non-credit Subject

Course Code MCE 6190 Course Title Special Studies

Contents: The students are required to undertake a mini project in the field of mechanical engineering in their respective specialization. The objective is to provide an opportunity to the students to develop initiative, creative ability, confidence and engineering judgement. The results of the work should be submitted in the form of a report which should include approximate drawings, charts, tables, references etc.

Course Code MCE 6290 Course Title Special Studies

Contents: The students are required to undertake a mini project in the field of mechanical engineering in their respective specialization. The objective is to provide an opportunity to the students to develop initiative, creative ability, confidence and engineering judgement. The results of the work should be submitted in the form of a report which should include approximate drawings, charts, tables, references etc.

CSE Courses for M.Sc.T.E. (2-year) Programme
Specialization: Computer Science and Engineering

1st Semester (Any two courses as offered by the CSE Department Some of the lists are as follows. Priority will get from following lists:)

Course No.	Course Title	Contract Hours	Credit Hours
CSE 6191	Web based Instruction and E-learning	3.00	3.00
CSE 6193	Distributed Database Systems	3.00	3.00
CSE 6195	Advanced Database Systems	3.00	3.00
CSE 6197	Distributed and Parallel Computing	3.00	3.00

2nd Semester (Any two courses as offered by the department)

Course No.	Course Title	Contract Hours	Credit Hours
CSE 6291	Information Security	3.00	3.00
CSE 6293	Data Warehousing and Mining	3.00	3.00
CSE 6295	Distributed Operating Systems	3.00	3.00
CSE 6297	Wireless Sensor Networks	3.00	3.00

3rd Semester (Any one course as offered by the department)

Course No.	Course Title	Contract Hours	Credit Hours
CSE 6391	Advanced Human Computer Interaction	3.00	3.00
CSE 6393	Advanced Operating Systems	3.00	3.00
CSE 6395	Mobile Computing	3.00	3.00

4th Semester (Any one course as offered by the department)

Course No.	Course Title	Contract Hours	Credit Hours
CSE 6491	Advanced Internet Computing	3.00	3.00
CSE 6493	Cloud Computing	3.00	3.00
CSE 6495	Advanced Computer Communications and Networks	3.00	3.00

1st Semester (Compulsory, Non-credit)

Course No.	Course Title	Contract Hours
CSE 6190	Special Studies[3] (Non-credit)	0-4

2nd Semester (Compulsory, Non-credit)

Course No.	Course Title	Contract Hours
CSE 6290	Special Studies (Non-credit)	0-4

[3] It is a practice-oriented course which students will achieve grade either S: 'Satisfactory, U: 'Unsatisfactory' or I: 'Incomplete' and it will be located in their final transcript. Respective teachers will assess this course and therefore teachers will be loaded contact hours as per rule.

CSE Courses for M.Sc.T.E. (2-year) Programme
Specialization: Computer Science and Engineering

Course Code CSE 6191 Course Title Web based Instruction and E-learning

Credit Hours 3-0-0

Contents: Introduction to web-based instruction (WBI): what is and why Web-based learning environments and critical issues: WBI and traditional classroom: similarities and differences, Distance learning environment via the www, motivational framework,

Designing and delivering WBI: implementing, management of instructional materials, testing and evaluation of WBI. WBI case studies.

What is e-learning, open, flexible and distributed learning environment, a framework for e-learning, components and features of e-learning

Institutional, management, technological, pedagogical, ethical, interface design, resource support and evaluation issues of e-learning.

Course Code CSE 6193 Course Title Distributed Database Systems

Course Hours 3-0-0

Contents: Parallel and Distributed Database Systems:

Database System Architecture: Centralized System, Client-Server Systems, Parallel Systems, Distributed Systems, Network Types, Distributed Data Storage, Network Transparency, Data Query Processing, Data Transaction Model, Commit protocols, Coordinator Selection, Concurrency Control, Deadlock Handle, Multi Database system, Design of Distributed Database, Location of Database, Multiple copies of Data, Distributed Database and Applications.

Course Code CSE 6195 Course Title Advanced Database Systems

Credit Hours 3-0-0

Contents: Object Oriented Database; Data Model, Design, Languages;

Object Relational Database: Complex data types, Querying with complex data types, Design;

Distributed Database: Levels of distribution transparency, Translation of global queries to fragment queries, Optimization of access strategies, Management of distributed transactions, Concurrency control, Reliability, Administration; Parallel Database: Different types of parallelism, Design of parallel database; Multimedia Database Systems Basic concepts, Design, Optimization of access strategies, Management of Multimedia Database Systems, Reliability; Database Wire-housing/Data mining: Basic Concepts and algorithms. File organization and access, buffer management, performance analysis, and storage management. Database system architecture, query optimization, transaction management, recovery, concurrency control. Reliability, protection, and integrity. Design and management issues.

Course Code CSE 6197 Course Title Distributed and Parallel Computing

Credit Hours 3-0-0

Contents: Distributed object systems, Retrieving and caching of distributed information, Distributed data replication and sharing, Performance issues, Algorithms for deadlock detection, concurrency control and synchronization in distributed system, Models for distributed computation, Networking facilities and resource control and management methods in network and distributed operating systems, Collaborative applications, Wide area network computing, We based commerce, Agent systems and Market based computing.

Course Code CSE 6299 Course Title Information Security

Credit Hours 3-0-0

Contents: Security problem in computing, Elementary Cryptography, Programme Security, Protection in General-purpose Operating Systems, Designing Trusted Operating Systems, Database Security, Security in Networks, Security Administration, Legal, Privacy and Ethical issues.

Course Code CSE 6293 Course Title Data Warehousing and Mining

Credit Hours 3-0-0

Contents: Introduction; Data warehousing and OLAP technology for data mining; Data preprocessing; Data mining primitives, languages and systems; Descriptive data mining: characterization and comparison; Association analysis; Classification and prediction; Cluster analysis, Mining complex types of data; Applications and trends in data mining.

Course Code CSE 6295 Course Title Distributed Operating Systems

Credit Hours 3-0-0

Contents: Brief Introduction to distributed systems; special functions supported by corresponding OS. Network OS; remote login; remote file transfer. Distributed OS; transparent migration of process and data; remote procedure call; robustness, detection and recovery from failures. Distributed file system; mutual exclusion/ synchronization using centralized and distributed approaches; commit protocols, concurrency control, majority protocol and time stamping replication. Deadlock detection/prevention, centralized implementation, distributed algorithms.

Course Code CSE 6297 Course Title Wireless Sensor Networks

Credit Hours 3-0-0

Contents: Introduction: applications; Localization and tracking: tracking multiple objects; Medium Access Control: IEEE 802.15.4, S-MAC, T-MAC, P-MAC, B-MAC, Z-MAC, and ZigBee; Geographic and energy-aware routing; Challenges of low power wireless networking protocols and applications. The OSI model, IEEE-802.11, Bluetooth, IEEE-802.15.4, IEEE 1451, hardware considerations, traffic patterns, media access (CSMA, TDMA, RTS/CTS, idle listening), DSSS, UWB, radio propagation models, cross-layer interactions, flooding, dissemination, gossip, epidemics, probabilistic approaches, global versus local communication, and in-network processing. Attribute-Based Routing: directed diffusion, rumor routing, geographic hash tables; Infrastructure establishment: topology control, clustering, time synchronization; Sensor tasking and control: task-driven sensing, information-based sensor tasking, joint routing and information aggregation; Sensor network databases: challenges, querying the physical environment, in-network aggregation, data indices and range queries, distributed hierarchical aggregation; Sensor network platforms and tools: sensor node hardware, sensor network Programmeming challenges; other state-of-the-

art related topics. Students read papers and build working protocols on TinyOS, a low-power embedded operating system.

Course Code CSE 6391 Course Title Advanced Human Computer Interaction

Credit Hours 3-0-0

Contents: Overview of Human-Computer Interaction basics; human factors and ergonomics, human cognitive capabilities and limitations, human information processing; interaction techniques and interface types, metaphors; design principles and guidelines for intelligent user interface; interaction framework; interaction paradigm: ubiquitous computing, pervasive computing, context-aware computing; requirement analysis tools and techniques, ethnographic approach of data gathering, contextual design, contextual inquiry; tools and techniques for developing prototypes; evaluation of design, different evaluation tools and techniques; user centered design, HCI as a software engineering lifecycle model; usability engineering.

Course Code CSE 6393 Course Title Advanced Operating Systems

Credit Hours 3-0-0

Contents: Brief review of process synchronization in a multiprocessing/ multiprogamming systems. Inter process communication and co-ordination in large distributed systems.

Information management: information management in distributed network: security, integrity and concurrency problems in sharing of information-techniques in distributed systems. Case studies of contemporary systems.

Course Code CSE 6395 Course Title Mobile computing

Credit Hours 3-0-0

Introduction, Business Contexts of Mobile Applications, Mobile Application Architectures, Mobile Infrastructure, The Wireless Internet World Stage,The Equipment and Technology of Wireless, Wireless Networks (1G, 2G, 2.5G, 3G),Wireless Internet Applications and Content , Wireless Services , Mobile Client User Interface, Mobile Client Applications, Servlets, SORCER Services, J2ME/MIDP 2.0 Programmeming, Building MIDlets, CLDC (Connected, Limited Device Configuration), Creating MIDP UIs , Client-Server Data Transfer, Connecting to the World (services).

Mobilizing Existing Application Architectures, Mobility and Location Management, Mobile Application Development Management, Persistent Storage, Mobile Applications, Pocket Web Host Design, The Game API, Sound and Music, Sample MIDP Applications, Data Management, Performance Tuning, Parsing XML, Security, Protecting Network Data, Mobile Ad Hoc and Sensor Networks, Security for Mobile and Wireless Computing

Course Code CSE 6491 Course Title Advanced Internet Computing

Credit Hours 3-0-0

Contents: Introduction to Internet Technology, web servers and HTTP, URLs, Forms and CGI, JavaScript, Cookies, Java and Servlets, Databases and ASP, JDBC

Markup languages – SGML, HTML, DHTML, XML, WML, their standards, Publishing information in XML and WML, Extracting product information and application development with XML or WML.

Active server pages, IIS and PWS environment, ASP variables and control structures, data storage and access, ASP object models, advanced data handling techniques.

Application development using Java Scripts, Java applets, Java Servlets, Java Database Connectivity (JDBC)

Introduction to PHP Programmeming, variables and control structures, Database connectivity and Application development with PHP

Course Code CSE 6493 Course Title Cloud Computing

Credit Hours 3-0-0

Contents: Review of cloud computing: Types of cloud computing; enabling technologies-virtualization, Web services, SOA, Web 2.0,mashup; cloud features; platforms. Comparable technologies: Grid Computing; Utility Computing; The role of grid computing in cloud computing; Difference between cloud and utility computing. Cloud architecture: Cloud scheduling; Scalability, reliability and security of the cloud; Workflow management in cloud; Network infrastructure for cloud computing. Cloud service Models: SaaS, PaaS, IaaS, DaaS. Cloud computing applications and solutions: Virtual private cloud; Scientific services and data management in cloud; Enterprise cloud; Medical information systems. Cloud business models.

Course Code CSE 6495 Course Title Advanced Computer Communications and Networks

Credit Hours 3-0-0

Overview of Internet Technology, Internet services, Electronic Mail, Usenet, SNMP, SMTP, URL, URI, HTTP, MIME, WWW and E-commerce. Networking with TCP/IP, TCP/IP sub protocols, TCP/IP administration and troubleshooting, the Internet protocol, Routing algorithms, Congestion Control Algorithms, IP addressing, Subnetting, Gateways, Sockets and ports. ARP, RARP, multicasting, IPV4 and IPV6, ICMPV6, Host names and DNS, Name servers, BOOTP, DHCP and WINS. Introduction to wireless networks, wireless media, wireless LAN, wireless LAN protocols, wireless ATM networks, voice over IP (VoIP), Mobile IP, Internet using mobile phones, Roaming Algorithms, Handover techniques, satellite communications. Network security, security requirements, security audits, security risks, data encryption, cryptographic principles, different key-algorithms, digital signatures and firewalls. Managing and Maintaining a network, network troubleshooting, performance evaluation, network upgrade, ensuring integrity and availability, fault tolerance, data backup, disaster recovery.

Non-credit Subject

Course Code CSE 6190 Course Title Special Studies

Contents: The students are required to undertake a mini project in the field of Computer science and engineering in their respective specialization. The objective is to provide an opportunity to the students to develop initiative, creative ability, confidence and engineering judgement. The results of the work should be submitted in the form of a report which should include approximate drawings, charts, tables, references etc.

Course Code CSE 6290 Course Title Special Studies

Contents: The students are required to undertake a mini project in the field of Computer science and engineering in their respective specialization. The objective is to provide an opportunity to the students to develop initiative, creative ability, confidence and engineering judgement. The results of the work should be submitted in the form of a report which should include approximate drawings, charts, tables, references etc.