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Curriculum for Undergraduate Degree (B.Tech.) in Electronics and Communication (VLSI Design) (w.e.f. AY: 2020-21)

Part III: Detailed Curriculum

Eighth Semester

Course Name:	Low Power VLSI		
Course Code:	PE-EC(V)801A	**Category:**	Professional Elective
Semester:	Eighth	**Credit:**	3
L-T-P:	3-0-0	**Pre-Requisites:**	Digital VLSI PC-EC(V)602
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To impart basic concept of low power VLSI Design.
2	To impart knowledge about Power loss in VLSI Circuits.
3	To understand the different Low power Techniques.
4	To understand the basic principle of power reduction in clocked networks.
5	To understand the principle of power reduction in clocked networks.
6.	To explain design aspects of low power circuits.

Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	**Introduction to low power VLSI design:** Introduction to low power VLSI design-Need for low power-Charging and Discharging Capacitance-Short Circuit Current in CMOS Circuit-CMOS leakage current-static current-Basic principles of low power design	8
2	**Low Power Techniques:** Circuit - transistor and gate sizing - pin ordering - network restructuring and reorganization - adjustable threshold voltages – local restructuring-logic-signal gating - logic encoding. Pre-computation logic.	8
3	**Power Reduction in clocked networks:** Power reduction in clock networks – Clock Gating-CMOS floating node - low power bus - delay balancing - SRAM.	6

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4	**Reduction Techniques:** Switching activity reduction - parallel voltage reduction - operator reduction - Adiabatic computation - pass transistor logic .	8
5	**Low power circuit design:** Low power circuit design style - Software power estimation - co design.	6
Total		**36**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Explain the area of power loss in VLSI circuits.
2	Design different low power techniques in VLSI circuits.
3	Solve simple design based problems related to circuits using CMOS and pass transistor Logic.
4	Analyze different Low power techniques used in VLSI circuits.

Learning Resources:	
1	Gary Yeap "Practical Low Power Digital VLSI Design", 1997
2	Kaushik Roy , Sharat C. Prasad, "Low power CMOS VLSI circuit design", Wiley Inter science Publications". (1987)

Course Name:	**Processor Architecture for VLSI Design**		
Course Code:	PE-EC(V)801B	**Category:**	Professional Elective
Semester:	Eighth	**Credit:**	3
L-T-P:	3-0-0	**Pre-Requisites:**	Computer Architecture
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	Illustrate the concept of Parallel Processing and its applications.
2	To impart the knowledge of the Hardware for Arithmetic Operations.
3	To develop an insight in the performance of different scalar Computers.
4	To develop and enhance the Pipelining Concept for a given set of Instructions.
5	Discriminate the performance of pipelining and non pipelining environment in a processor

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Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	Components of (an embedded) computer, Architecture organization, Von-Neumann vs Harvard, Microcoded vs hardwired, scalar and vector processors, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.	8
2	Flynn's taxonomy CISC arch, the RISC movement, ISA arch, basic structure, pipelining, pipeline hazards and solutions, comparison, merging RISC and CISC: Pipeline and vector processing: Addition and Subtraction, Hardware Implementation, Multiplication Algorithms and Hardware Implementation, Division Algorithms and Hardware Implementation, Floating Point Arithmetic Operations.	10
3	Parallel Computer Models : Evolution of Computer Architecture, System Attributes to Performance, Shared Memory Multiprocessors, Distributed Memory Multicomputers, Vector Super Computers, SIMD Super Computers.	8
4	Processors and Memory Hierarchy : Advanced Processor Technology: Design Space of Processors, Instruction-Set Architectures, CISC scalar Processors, RISC scalar Processors, Super Scalar and Vector Processors: Superscalar Processors.	8
5	Pipelining and Superscalar Techniques : Linear Pipeline Processors: Asynchronous and Synchronous models, Clocking and Timing Control, Speedup, Efficiency and Throughput, Pipeline Schedule Optimization, Instruction Pipeline Design: Instruction Execution Phases, Mechanisms for Instruction Pipelining, Dynamic Instruction Scheduling, Branch Handling Techniques.	8
Total		**40**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Understand the Concept of Parallel Processing and its applications.
2	Implement the Hardware for Arithmetic Operations.
3	Analyze the performance of different scalar Computers.
4	Develop the Pipelining Concept for a given set of Instructions.
5	Distinguish the performance of pipelining and non-pipelining environment in a processor

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Learning Resources:	
1	Computer System Architecture, Morris M. Mano, 3rd edition, Pearson/Prentice Hall India.
2	Advanced Computer Architecture, Kai Hwang, McGraw-Hill, India.
3	Computer Organization and Architecture, William Stallings ,8th edition, PHI
4	Computer Organization, Carl Hamachar, Vranesic,Zaky, 5th edition, McGraw Hill.

Course Name:	Renewable Energy		
Course Code:	PE-EC(V)802A	**Category:**	Professional Elective
Semester:	Eighth	**Credit:**	3
L-T-P:	3-0-0	**Pre-Requisites:**	Basic knowledge of Electronics, Mechanics and Electrical engineering
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To have an idea about different sources of renewable energy that would be sustainable.
2	To introduce students with renewable energy resources availability, potential and suitability as a substitute for conventional energy resources in future energy demand
3	To facilitate the students to achieve a clear conceptual understanding of technical aspects of different renewable Sources of Energy
4	

Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	**Classification of Energy Sources:** Advantages of Non-Conventional Energy Sources over Conventional Sources Economics, Impact on Environment, Electricity Generation from Non-Conventional Energy Sources:	2
2	**Solar Energy:** Sun as source of energy, Solar radiation and its Characteristics, Principles of Solar Collectors: flat Plate, focusing, Solar Energy use for water heating, Solar passive space heating and cooling systems, Solar thermal power generation, and Hybrid solar power. Principle of energy conversion in solar cells, Photovoltaic, Different types of PV Cells, Mono-poly crystalline and amorphous Silicon solar cells. Design of PV array. Efficiency and cost of PV systems.	10
3	**Wind Energy:** Wind as energy source, expression for power development because of wind, Design of Wind turbine, Selection of site of Wind farm, characteristics of different types of wind generators used with wind turbines	6

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4	**Hydel Energy:** Electricity generation from micro hydel plants, location, auxiliaries and associated problems	3
5	**Biomass Energy:** Resources and conversion process: bio gas conversion, bio gas plant, bio mass gasifier. co-generation, Bio diesel: Sources, usability and advantages over mineral product	3
6	**Ocean Energy:** Tidal Energy: Principle, selection of site and future prospect Wave Energy: Principle , selection of site and future prospect	4
7	**Geo thermal Energy:** Principle , location , economics and prospect	2
8	**Fuel Cells:** Principle of fuel cells, Different types of fuel cells, advantages and limitations,	2
9	**Magneto hydrodynamics energy conversion:** Principle, Economics and environmental aspect of MHD generation	2
10	**Smart Grid :** Concept of Smart Grid	2
Total		**36**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Discuss the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment.
2	Describe the basics of solar energy and use of solar energy for heating as well as photovoltaic generation.
3	Identify Winds energy as alternate form of energy and to know how it can be tapped
4	Explain the principle of generation and use of different renewable energy sources such as ocean energy, hydel energy, geothermal energy, biomass energy, magneto hydrodynamics energy conversion etc.

Learning Resources:	
1	B.H. Khan " Non-Conventional Energy Resources", McGrawHill Education
2	G. Boyle, Renewable Energy, 2nd Edition, Oxford University Press, 2010.
3	J. Twidell and T. Weir, Renewable Energy Resources, 2nd Edition, Taylor & Francis, 2006
4	Solar Energy: Fundamentals, Design, Modelling and Applications by G. N. Tiwari

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Course Name:	Speech and Audio Processing		
Course Code:	PE-EC(V)802B	**Category:**	Professional Elective
Semester:	Eighth	**Credit:**	3
L-T-P:	3-0-0	**Pre-Requisites:**	Signals and Systems (PC-EC303)
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To understand the mathematical modeling of speech signal processing and different speech coding standards.
2	To be aware of the basic understanding of linear prediction of speech and different speech quantization techniques.
3	To know about the linear prediction coding and the limitations of it.
4	To have the knowledge of code excited linear prediction.

Course Content:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	**Introduction:** Speech production and modelling - Human Auditory System; General structure of speech coders; Classification of speech coding techniques - parametric, waveform and hybrid ; Requirements of speech codecs -quality, coding delays, robustness.	2
	Speech Signal Processing: Pitch-period estimation, all-pole and all-zero filters, convolution; Power spectral density, periodogram, autoregressive model, autocorrelation estimation.	4
2	**Linear Prediction of Speech:** Basic concepts of linear prediction; Linear Prediction Analysis of non-stationary signals -prediction gain, examples; Levinson-Durbin algorithm; Long term and short-term linear prediction models; Moving average prediction.	6
	Speech Quantization: Scalar quantization-uniform quantizer, optimum quantizer, logarithmic quantizer, adaptive quantizer, differential quantizers; Vector quantization - distortion measures, codebook design, codebook types.	4
3	**Scalar Quantization of LPC:** Spectral distortion measures, Quantization based on reflection coefficient and log area ratio, bit allocation; Line spectral frequency - LPC to LSF conversions, quantization based on LSF.	6

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	Linear Prediction Coding: LPC model of speech production; Structures of LPC encoders and decoders; Voicing detection; Limitations of the LPC model.	4
4	**Code Excited Linear Prediction:** CELP speech production model; Analysis-by-synthesis; Generic CELP encoders and decoders; Excitation codebook search - state-save method, zero-input zero-state method; CELP based on adaptive codebook, Adaptive Codebook search; Low Delay CELP and algebraic CELP.	6
	Speech Coding Standards: An overview of ITU-T G.726, G.728 and G.729 standards	4
Total		**36**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Describe the mathematical modeling of speech signal processing and different speech coding standards.
2	Understand and analyze linear prediction of speech and different speech quantization techniques.
3	Understand and analyze linear prediction coding.
4	Understand and model code excited linear prediction.

Learning Resources:	
1	"Digital Speech" by A. M. Kondoz, Second Edition (Wiley Students" Edition), 2004.
2	"Speech Coding Algorithms: Foundation and Evolution of Standardized Coders", W. C. Chu, Wiley Inter science, 2003.

Course Name:	**Internet of Things**		
Course Code:	OE-IT801C	**Category:**	Open Elective
Semester:	Eighth	**Credit:**	3
L-T-P:	3-0-0	**Pre-Requisites:**	Programming for problem solving and basic knowledge of Computer Network.
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To understand the terminology, technology and its applications
2	To understand the concept of M2M (machine to machine) with necessary protocols
3	To learn the Python Scripting Language and the Raspberry PI platform, used in many IoT devices and applications.
4	To understand the implementation of web based services on IoT devices.

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Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	**Introduction to Internet of Things:** Definition and characteristics of IoT, **Physical design of IoT-** Things in IoT ,IoT Protocols, **Logical Design of IoT-** IoT communication models, Iot Communication APIs , **IoT enabled technologies-**Wireless sensor networks, Cloud computing, Big data analytics, Communication protocols, Embedded systems, IoT levels and deployment templates.	10
2	**IoT and M2M Introduction**, M2M-Difference between IoT and M2M, SDN and NFV for IoT Software Defined Networking, Network Function Virtualization. Difference between SDN and NFV for IoT. Basics of IoT System Management with NETCOZF.	6
3	**Introduction to Python:** Language features of Python, Data types, Data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling. Different Python packages.	6
4	**IoT Physical Devices and Endpoints:** Introduction to Raspberry PI- Interfaces (serial, SPI, I2C). Programming-- Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.	6
5	**IoT Physical Servers and Cloud Offerings:** Introduction to Cloud Storage models and communication APIs. Webserver – Web server for IoT, Cloud for IoT, Python web application framework. Designing a RESTful web API	8
Total		**36**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Explain the definition and usage of the term "Internet of Things" in different contexts
2	Explain the key components that make up an IoT system.
3	Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack
4	Build and test a IoT system involving prototyping, programming and data analysis

Learning Resources:	
1	Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015.
2	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Pearson Education, 2017.
3	Internet of Things, K.G. Srinivasa , G.M. Siddesh, R.R. Hanumantha, CENGAGE Leaning India, 2018

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4	Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2016.
5	Internet of Things (A Hands-on-Approach), Arshdeep Bahga and Vijay Madisetti, VPT, 2014.
6	Internet of Things: Architecture and Design Principles, Raj Kamal , McGraw Hill Education,2017

Course Name:	Big Data Analytics		
Course Code:	OE-CS801C	**Category:**	Open Elective
Semester:	Eighth	**Credit:**	3
L-T-P:	3-0-0	**Pre-Requisites:**	DBMS, JAVA, PYTHON
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To learn the concepts of Big Data and Hadoop
2	To understand and apply the concept of HDFS and MapReduce
3	To deal with Big Data using Hive, Pig, HBase, Impala, Sqoop

Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	Introduction to big data: Variety of Big Data. Big Data and its Importance of 3 V's, 4 V's, 6 V's of Big Data, Characteristics' of Big Data. Introduction of Hadoop, Benefit of Hadoop, Core Components of Hadoop, Other Components of Hadoop, Hadoop Cluster, Hadoop Start-up Mode. Introduction to HDFS, Architecture of HDFS, Role and types of Name Node, HDFS Commands.	12
2	Introduction to MapReduce, Flow of Map Reduce, Word Count Problem by Using Map Reduce etc.	4
3	Introduction to Hive, Architecture of Hive, Data Types of Hive, Hive Query language, Handling Complex Data Types, Scripting in Hive, Different join operations on database tables. Introduction to PIG, Data Types in Pig, Pig Latin, Scripting in Pig.	10
4	Introduction to Sqoop, import data from HDFS To MySQL, Import data From Hive to MySQL. Exporting Data from Hive to Mysql.	4
5	Introduction to NoSQL, Types of NoSQL Databases. Introduction to HBase. Introduction to Impala.	6
Total		**36**

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Course Outcomes:	
After completion of the course, students will be able to:	
1	Describe the concept of Big Data, Hadoop and HDFS
2	Describe the concept of Map Reduce, Hive, HBase, Pig, Sqoop and Impala
3	Demonstrate the concept of data transfer between HDFS, MySQL and Hive.
4	Apply NoSQL for importing and exporting unstructured data

Course Contents:

Learning Resources:	
1	Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
2	DT Editorial Services, "Big Data, Black Book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R and Data Visualization", Dreamtech Press India Pvt. Ltd., 2020
3	Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
4	Rajkumar Buyya, "Big Data Principles and Paradigms", MK
5	Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
6	Lars George, "HBase: The Definitive Guide", O'Reilley, 2011
7	Alan Gates, "Programming Pig", O'Reilley, 2011.
8	Bart Baesens "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley & Sons,2014

Course Name:	Entrepreneurship		
Course Code:	OE-HU801D	**Category:**	Open Elective
Semester:	Eighth	**Credit:**	3
L-T-P:	3-0-0	**Pre-Requisites:**	Basic understanding of Marketing and Finance
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To develop and strengthen entrepreneurial quality and motivation in students.
2	To impart basic entrepreneurial skills and understandings to run a business efficiently and effectively

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Module No.	Description of Topic	Contact Hrs.
1	**ENTREPRENEURAL COMPETENCE & ENVIRONMENT** Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality - Characteristics of Successful, Entrepreneur – Knowledge and Skills of Entrepreneur Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organizational Services - Central and State Government Industrial Policies and Regulations - International Business	9
2	**BUSINESS PLAN PREPARATION** Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria. Funding & Scaling Up, Ideation & Validation, Compliance & Business Plan Communication	7
3	**LAUNCHING OF SMALL BUSINESS** Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection -Growth Strategies - Product Launching – Incubation, Angel Investor & Venture capital, IT startups. Validation Feasibility, ESOP, Field of Analytics based start up	8
4	**MANAGEMENT OF SMALL BUSINESS** Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units- Effective Management of small Business	6
Total		**30**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Develop some knowledge and skills needed to run a business
2	Prepare proposal and business plan independently.
3	Understand the central and state government policies and regulations
4	Understand basics of venture capital, incubations and IT Startups.

Learning Resources:	
1	Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001
2	S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi.

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Course Name:	Organizational Behaviour		
Course Code:	HM-HU801	**Category:**	Management Science and Humanities Courses
Semester:	Eighth	**Credit:**	3
L-T-P:	3-0-0	**Pre-Requisites:**	To know the existence of organization as a place for human livelihood
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To help the students to develop cognizance of the importance of human behavior and how to align it with basic organizational theories
2	To enable students to describe how people behave under different conditions and understand why people behave as they do
3	To provide the students to analyze specific strategic human resources demands for future action
4	To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behaviour and improve results

Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	**Introduction of Organizational Behavior** : Introduction, definition, historical development, An OB model;contributing disciplines, challenges and opportunities	3
2	**Foundations of Individual Behavior**: Individual behavior; Intellectual abilities, Physical ability, the role of disabilities. Personality: Meaning, formation, determinants, traits of personality, big five and MBTI, personality attributes influencing OB. Attitude: Formation, components of attitudes, relation between attitude and behavior;Learning; Perception: Process of perception, factors influencing perception, link between perception and individual decision-	6

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	making; Transactional Analysis: An Introduction to Transactional Analysis;Johari window.	
3	**Group Dynamics and Team Development**: Group dynamics -definition and importance, types of groups, group formation, group development, group composition, group performance factors; Principle-centered-approach to team development	5
4	**Motivation**: Meaning, theories of motivation-needs theory, two factor theory, Theory X and Y, application of motivational theories. Job satisfaction. Case Study analysis. **Leadership**: Meaning, styles of leadership, leadership theories, trait theory, behavioral theories, managerial grid, situational theories.	8
5	**Power and Authority** :Definition of Power –Types of Power; Power and Politics in Organization; Organizational Stress ; Conflict: Nature of Conflict & Conflict Resolution; Case Study Analysis	4
6	**Organizational Change and Development**: Planned Change & OB Techniques; Organizational Development; Organizational Culture: Meaning & Definition, Contemporary Models of Culture and Organizational Effectiveness; Cross Cultural Management	4
Total		**30**

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Course Outcomes:	
After completion of the course, students will be able to:	
1	emonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization
2	Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
3	Analyze the complexities associated with management of the group behavior in the organization
4	Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.

Learning Resources:	
1	Robbins, S.P. Judge, T.A. &Sanghi, S.: Organizational Behaviour, Pearson
2	Luthans, Fred: Organizational Behaviour, McGraw Hill
3	Newstrom J.W. & Devis K.: Organizational Behavior, McGraw Hill
4	Aswathappa ,K : Organisational Behaviour ,Himalaya Publishing House
5	Shukla, Madhukar : Understanding Organizations – Organizational Theory & Practice in India, Prentice Hall
6	Sekharan, Uma: Organisational Behaviour , The McGraw –Hill Companies

Course Name:	Project-II		
Course Code:	PW-EC(V)881	**Category:**	Sessional
Semester:	Eighth	**Credit:**	4.5
L-T-P:	0-0-9	**Pre-Requisites:**	Knowledge on domain of project work and associated tools.
Full Marks:	100		
Examination Scheme:	Semester Examination: 100	Continuous Assessment: 00	Attendance: 00

Course Objectives:	
1	To impart concepts of literature survey .
2	To impart knowledge about handling a topic independently to develop an approach for solution.
3	To impart knowledge about preliminary Modelling/Simulation/Experiment/Design related to the topic
4	To impart knowledge about writing a project report and preparing presentation on the topic.

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Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
	The objective of Project Work II is to enable the student to extend further the investigative study taken up under PROJECT I, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include: 1. In depth study of the topic assigned in the light of the Report prepared under PROJECT I. 2. Review and finalization of the Approach to the Problem relating to the assigned topic. 3. Preparing an Action Plan for conducting the investigation, including team work. 4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed. 5. Final development of product/process, testing, results, conclusions and future directions. 6. Preparing a paper for Conference presentation/Publication in Journals, if possible. 7. Preparing a Dissertation in the standard format for being evaluated by the Department. 8. Final Seminar Presentation before a Departmental Committee.	30

Course Outcomes:	
After completion of the course, students will be able to:	
1	Describe their project objective and state different research-oriented topics reviewed, related to their project work
2	Formulate mathematical expressions/ design electronic circuits relevant to their project objective.
3	Practically implement the designed circuits, apply different scientific software tools and techniques for design, simulation, analysis and interpretation.
4	Report and present their work and function in collaboration with the team members.

Learning Resources:	
1	Associated Books, Journals, Magazines and resources from Internet.

MCKV INSTITUTE OF ENGINEERING

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243 G.T. Road (N), Liluah, Howrah- 711204, West Bengal, India
Ph: +91 33 26549315/17 Fax +91 33 26549318 Web: www.mckvie.edu.in

Course Name:	**Comprehensive Viva Voce**		
Course Code:	PW-EC(V)882	**Category:**	Sessional
Semester:	Eighth	**Credit:**	1
L-T-P:	0-0-0	**Pre-Requisites:**	Comprehensive Knowlegdge of all courses under ECE
Full Marks:	100		
Examination Scheme:	Semester Examination: 100	Continuous Assessment: 00	Attendance: 00

Course Objectives:	
1	To develop the technique of self study and recapitulation of any subject in order to prepare oneself for answering in front of an examination panel.

Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
	The Comprehensive Viva Voce will enable the student to take up exhaustive study and recapitulation in the broad field of Electronics & Communication Engineering, and associated areas in order to be able to answer a panel of experts during any kind of examination or interview.	

Course Outcomes:	
After completion of the course, students will be able to:	
1	Express themselves effectively.
2	Apply knowledge to tackle unknown questions.
3	Review literature to independently study unknown modern topic.

Learning Resources:	
1	Relevant Books and Technical Magazines.