HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution, Affiliated to Anna University, Chennai
Approved by AICTE, New Delhi & Accredited by NAAC with 'A' Grade)
Coimbatore – 641 032

B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING

HINDUSTHAN EDUCATIONAL AND CHARITABLE TRUST

HICET

Curriculum & Syllabus

2017-2018

CHOICE BASED CREDIT SYSTEM

VISION AND MISSION OF THE INSTITUTION

VISION

To become a premier institution by producing professionals with strong technical knowledge, innovative research skills and high ethical values.

MISSION

IM1: To provide academic excellence in technical education through novel teaching methods.

IM2: To empower students with creative skills and leadership qualities.

IM3: To produce dedicated professionals with social responsibility.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

ACADEMIC COUNCIL
Chairman
HICET COLLEGE OF ENGG & TECH

VISION AND MISSION OF THE DEPARTMENT

VISION

To impart quality technical education in the field of electronics and instrumentation engineering and strive to serve the society.

MISSION

M1. To enrich technical knowledge through effective teaching-learning process.

M2. To inculcate leadership and managerial skills.

M3. To create passion for serving the society with innovation and ethical responsible.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

ACADEMIC COUNCIL
Chairman
COLLEGE OF ENGG & TECH

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO 1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Chairman - BoS
EIE - HiCET

ACADEMIC COUNCIL
Chairman
COLLEGE OF ENGG & TECH

Dean (Academics)
HiCET

PO 6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Chairman - BoS
EIE - HiCET

ACADEMIC COUNCIL
Chairman
K.S.R. COLLEGE OF ENGG. & TECH.

Dean (Academics)
HiCET

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1. Ability to apply concepts of measurement and sensor to design, calibrate and control various process instruments using industrial automation.

PSO 2. Ability to analyze advanced electronics and instrumentation concepts required for industrial and research pursuits.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1. Graduates would have strong foundation in basic science and mathematics to formulate, analyze and solve electronics and instrumentation problems.

PEO 2. Graduates shall have good knowledge of instrumentation systems and their applications to design control and safety systems for industrial process.

PEO 3. Graduates exhibit professionalism with ethics, communication and team work to satisfy the needs of the society.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

ACADEMIC COUNCIL
Chairman
COLLEGE OF ENGG & TECH

CURRICULUM

HINDUSTHAN EDUCATIONAL AND CHARITABLE TRUST
HICET

Hindusthan College of Engineering and Technology

(An Autonomous Institution, Affiliated to Anna University, Chennai
Approved by AICTE, New Delhi& Accredited by NAAC with 'A' Grade)
Coimbatore, Tamil Nadu.

TÜVRheinland CERTIFIED

DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING (UG)

REGULATION-2016

For the students admitted during the academic year 2017-2018 and onwards

SEMESTER – I

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
THEORY									
1	16MA1101	Engineering Mathematics-I (Matrices and Calculus)	3	1	0	4	25	75	100
2	16PH1101	Engineering Physics	3	0	0	3	25	75	100
3	16CY1101	Engineering Chemistry	3	0	0	3	25	75	100
4	16HE1101R	Essential English for Engineers -I	3	1	0	4	25	75	100
5	16GE1101	Computer Programming	3	0	0	3	25	75	100
6	16ME1201	Basics of Civil and Mechanical Engineering	3	1	0	4	25	75	100
PRACTICAL									
7	16PS1001	Physical Sciences Lab – I	0	0	2	1	50	50	100
8	16GE1002	Engineering Practices Laboratory	0	0	4	2	50	50	100
9	16GE1003	Value Added Course I : Language Competency Enhancement Course-I	0	0	2	1	0	100	100
10	16GE1001	Computer Programming Lab	0	0	4	2	50	50	100
		Total Credits:	**18**	**3**	**12**	**27**	**300**	**700**	**1000**

SEMESTER – II

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
THEORY									
1	16MA2102	Engineering Mathematics-II (Vector Calculus, Complex variables and Laplace transforms)	3	1	0	4	25	75	100
2	16PH2102	Physics of Materials	3	0	0	3	25	75	100
3	16CY2102	Environmental Science	3	0	0	3	25	75	100
4	16HE2102R	Essential English for Engineers - II	3	1	0	4	25	75	100
5	16GE2102	Engineering Graphics	2	0	4	4	25	75	100
6	16EI2201	Electrical Circuit Theory	3	0	0	3	25	75	100
PRACTICAL									
7	16PS2001	Physical Sciences Lab - II	0	0	2	1	50	50	100

8	16EI2001	Electrical Circuit Laboratory	0	0	4	2	50	50	100
9	16GE2001	Value Added Course II: Language Competency Enhancement Course-II	0	0	2	1	0	100	100
		Total Credits:	**17**	**2**	**12**	**25**	**250**	**650**	**900**

For the students admitted during the academic year 2016-2017 and onwards

SEMESTER - III

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
		THEORY							
1	16MA3103	Fourier Analysis and Statistics	3	1	0	4	25	75	100
2	16EI3201	Electronic Instrumentation	3	0	0	3	25	75	100
3	16EI3202	Electronic Devices and Circuits	3	0	0	3	25	75	100
4	16EI3203	Measurements and Instrumentation	3	0	0	3	25	75	100
5	16EI3204	Transducer Engineering	3	0	0	3	25	75	100
6	16ME3231	Fundamentals of Thermodynamics and Fluid Dynamics	3	0	0	3	25	75	100
		PRACTICAL							
7	16EI3001	Transducer and Measurements Laboratory	0	0	4	2	50	50	100
8	16EI3002	Electronic Devices and Circuits Laboratory	0	0	4	2	50	50	100
		Total Credits:	**18**	**1**	**8**	**23**	**250**	**550**	**800**

SEMESTER – IV

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
		THEORY							
1	16MA4107	Numerical Methods	3	1	0	4	25	75	100
2	16EI4201	Electrical Machines	3	0	0	3	25	75	100
3	16EI4202	Linear Integrated Circuits and Applications	3	0	0	3	25	75	100
4	16EI4203	Digital Logic Circuits	3	0	0	3	25	75	100
5	16EI4204	Power Plant Instrumentation	3	0	0	3	25	75	100
6	16EI4205	Industrial Instrumentation - I	3	0	0	3	25	75	100
		PRACTICAL							
7	16EI4001	Electrical Machines Laboratory	0	0	4	2	50	50	100
8	16EI4002	Linear and Digital Integrated Circuits Laboratory	0	0	4	2	50	50	100
		Total Credits:	**18**	**1**	**8**	**23**	**250**	**550**	**800**

CREDIT DISTRIBUTION

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	27	25	23	23	25	24	24	16	**187**

Chairman, Board of Studies

Chairman - BoS
EIE - HiCET

Dean – Academics

Dean (Academics)
HiCET

Principal

PRINCIPAL
Hindusthan College of Engineering & Technology
COIMBATORE - 641 032

HINDUSTHAN ACADEMIC COUNCIL
Chairman
HINDUSTHAN COLLEGE OF ENGG & TECH

SYLLABUS

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16MA1101	ENGINEERING MATHEMATICS – I (MATRICES AND CALCULUS) (COMMON TO ALL BRANCHES)	3	1	0	4

Course Objective

1. Develop the skill to use matrix algebra techniques that is needed by engineers for practical applications.
2. Find curvature, evolutes and envelopes using the concept of differentiation.
3. Solve ordinary differential equations of certain types using Wronskian technique.
4. Familiarize the functions of several variables which are needed in many branches of engineering.
5. Understand the concept of double and triple integrals.

Unit	Description	Instructional Hours
I	**MATRICES** Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (without proof) – Cayley - Hamilton Theorem (excluding proof) – Orthogonal matrices – Diagonalization of matrices by orthogonal transformation–Reduction of a quadratic form to canonical form by orthogonal transformation.	12
II	**DIFFERENTIAL CALCULUS** Curvature in cartesian co-ordinates – Radius and Centre of curvature - Circle of curvature – Involutes and Evolutes(parabola, ellipse, cycloid, asteroid) – Envelopes - single parameter and two parameter family of curves.	12
III	**ORDINARY DIFFERENTIAL EQUATIONS** Second and higher order linear differential equations with constant coefficients and with RHS of the form e^{ax} , x^n, sinax or cosax , $e^{ax}f(x)$ and $xf(x)$ where $f(x)$ is sinbx or cosbx – Method of variation of parameters – Linear differential equations with variable coefficients (Euler's equation)	12
IV	**FUNCTIONS OF SEVERAL VARIABLES** Total differentiation (excluding implicit functions) - Partial derivatives of composite functions - Taylor's series for functions of two variables-Maxima and minima of functions of two variables - Lagrange's method of undetermined multipliers – Jacobians.	12
V	**MULTIPLE INTEGRALS** Double integrals in Cartesian coordinates – Change of order of integration – Area enclosed by the plane curves (excluding surface area) – Triple integrals in Cartesian co-ordinates – Volume of solids using Cartesian co-ordinates.	12
	Total Instructional Hours	**60**

Course Outcome

CO1: Calculate Eigen values and Eigen vectors for a matrix which are used to determine the natural frequencies (or Eigen frequencies) of vibration and the shapes of these vibrational modes.
CO2: Apply the concept of differentiation to find the radius, centre and circle of curvature of any curve.
CO3: Develop sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
CO4: Identify the maximum and minimum values of surfaces.
CO5: Computation of area of a region in simpler way by changing the order of integration and evaluation of triple integrals to compute volume of three dimensional solid structures.

TEXT BOOKS:

T1- Ravish R Singh, Mukul Bhatt, "Engineeing Mathematics", McGraw Hill education (India) Private Ltd.,Chennai,2017.
T2- Veerarajan T, "Engineering Mathematics–I", McGraw Hill Education(India) Pvt Ltd, New Delhi, 2016.

REFERENCE BOOKS :

R1-Bali N.P & Manish Goyal, "A Text book of Engineering Mathematics", 8th Edition, Laxmi Pub. Pvt. Ltd. 2011.
R2- Grewal B.S, "Higher Engineering Mathematics", 42nd Edition, Khanna Publications, Delhi, 2012.
R3- Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage learning,2012.
R4-Sivarama Krishna Das P and Rukmangadachari E., "Engineering Mathematics" Vol I, Second Edition, Pearson publishing, 2011.
R5- Wylie & Barett, "Advanced Engineering Mathematics", McGraw Hill Education, 6th edition, 2003.

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16PH1101	ENGINEERING PHYSICS (COMMON TO ALL BRANCHES)	3	0	0	3

Course Objective

1. Illustrate the fundamental knowledge in mechanical properties of matter and thermal physics.
2. Gain knowledge about laser and their applications.
3. Conversant with principles of optical fiber, types and applications of optical fiber.
4. Discuss the architectural acoustics and applications of Ultrasonics.
5. Extend dual nature of matter and the Necessity of quantum mechanics to explore the behavior of sub atomic particles.

Unit	Description	Instructional Hours
I	**PROPERTIES OF MATTER AND THERMAL PHYSICS** Elasticity – Hooke's law – Stress-strain diagram - Relation between three modulii of elasticity (qualitative) — Poisson's ratio – Bending moment – Depression of a cantilever – Derivation of Young's modulus of the material of the beam by Uniform bending – I-shaped girder. Modes of heat transfer – Thermal conductivity – Newton's law of cooling - Lee's disc method - Conduction through compound media (series and parallel).	9
II	**LASER AND APPLICATIONS** Spontaneous emission and stimulated emission – Population inversion – Pumping methods – Derivation of Einstein's coefficients (A&B) – Types of lasers – Nd:YAG laser, CO2 laser, Semiconductor lasers:(homojunction and heterojunction) – Laser Applications – Industrial applications: laser welding, laser cutting, laser drilling – Holography – Construction and reconstruction of images.	9
III	**FIBER OPTICS AND APPLICATIONS** Principle and propagation of light through optical fibers – Derivation of numerical aperture and acceptance angle – Classification of optical fibers (based on refractive index, modes and materials) – Crucible-crucible technique for fiber fabrication – Sources (LED and LASER) and detectors (p-i-n photodiode and avalanche photodiode) for fiber optics - Fiber optical communication link –Fiber optic sensors – Temperature and displacement sensors.	9
IV	**ACOUSTICS AND ULTRASONICS** Classification of sound – Weber–Fechner law – Sabine's formula (no derivation) - Absorption coefficient and its determination –Factors affecting acoustics of buildings and their remedies. Ultrasonic Production – Magnetostrictive generator – Piezoelectric generator – Determination of velocity using acoustic grating – Non destructive testing – Ultrasonic pulse echo system.	9
V	**QUANTUM PHYSICS AND APPLICATIONS** Black body radiation – Planck's theory (derivation) –Compton effect experimental verification only - Matter waves – Physical significance of wave function – Schroedinger's wave equations – Time independent and time dependent wave equations –Particle in a box (One dimensional) – Scanning electron microscope – Transmission electron microscope.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Enhance the fundamental knowledge in Properties of Matter and Thermal Physics.
CO2: Uunderstand the advanced technology of LASER in the field of Engineering and medicine.
CO3: Exposed the fundamental knowledge of Optical fiber in the field of communication Engineering.
CO4: Understand the production of ultrasonics and its applications in NDT.
CO5: Impart the fundamental knowledge on Quantum Physics.

TEXT BOOKS:

T1 - Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2011.
T2- Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2013.

REFERENCE BOOKS:

R1 - Arthur Beiser "Concepts of Modern Physics" Tata McGraw Hill, New Delhi – 2010
R2 - M.N Avadhanulu and PG Kshirsagar "A Text Book of Engineering physics" S. Chand and Company ltd., New Delhi 2014
R3 - Dr. G. Senthilkumar "Engineering Physics – I" VRB publishers Pvt Ltd., 2013

Chairman - BoS
EIE - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16CY1101	ENGINEERING CHEMISTRY (COMMON TO ALL BRANCHES)	3	0	0	3

Course Objective

1. The student should be conversant with boiler feed water requirements, related problems and water treatment techniques.
2. The student should be conversant with the principles of polymer chemistry and engineering applications of polymers and composites
3. The student should be conversant with the principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
4. To acquaint the student with important concepts of spectroscopy and its applications.
5. To acquaint the students with the basics of nano materials, their properties and applications

Unit	Description	Instructional Hours
I	**WATER TECHNOLOGY** Hard water and soft water- Disadvantages of hard water- Hardness: types of hardness, calculations, estimation of hardness of water – EDTA method - scales and sludges – boiler corrosion – priming and foaming – caustic embrittlement; Conditioning methods of hard water – External conditioning - demineralization process- Internal conditioning - domestic water treatment: screening, sedimentation, coagulation, filtration, disinfection – chlorine – UV method; desalination: definition, reverse osmosis.	9
II	**POLYMER & COMPOSITES** Polymerization – types of polymerization – addition and condensation polymerization – mechanism of free radical addition polymerization – copolymers – plastics: classification – thermoplastics and thermosetting plastics, preparation, properties and uses of commercial plastics – PVC, Teflon – moulding of plastics (extrusion and compression); rubber: vulcanization of rubber, synthetic rubber – butyl rubber, SBR; composites: definition, types of composites – polymer matrix composites – FRP.	9
III	**ENERGY SOURCES AND STORAGE DEVICES** Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power generator- classification of nuclear reactor- light water reactor- breeder reactor- solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline battery lead storage battery- nickel-cadmium battery- lithium battery- fuel cell H_2 -O_2 fuel cell applications.	9
IV	**ANALYTICAL TECHNIQUES** Beer-Lambert's law – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – interferences - estimation of nickel by atomic absorption spectroscopy.	9
V	**NANOMATERIALS** Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoparticles: definition, carbon nanotubes (CNT), types of carbon nano tubes – single walled and multi walled carbon nanotubes – synthesis of carbon nanotubes: chemical vapour deposition – laser ablation – arc-discharge method; properties of CNT: mechanical, electrical, thermal and optical properties; applications of carbon nanotubes in chemical field, medicinal field, mechanical field and current applications.	9
	Total Instructional Hours	**45**

Course Outcome

1. Illustration of the basic parameters of water, different water softening processes and effect of hard water in industries.
2. Knowledge on basic properties and application of various polymers and composites as an engineering material.
3. Summarize the various energy sources and energy storage devices
4. Analyze various analytical skills in handling various machines, instruments, apart from understanding the mechanism involved.
5. Describe the basic properties and application of nano materials.

TEXT BOOKS

T1 - P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2015).
T2 - O.G.Palanna, "Engineering chemistry" McGraw Hill Education India (2017).

REFERENCES

R1 - B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
R2 - B.K.Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2005).
R3 - S.S.Dara "A Text book of Engineering Chemistry" S.Chand & Co.Ltd., New Delhi (2010).

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL ★ Chairman ★ COLLEGE OF ENGINEERING & TECH

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16HE1101R	ESSENTIAL ENGLISH FOR ENGINEERS – I (COMMON TO ALL BRANCHES)	3	1	0	4

Course Objective

1. It fulfills the necessary skills needed in today's global workplaces.
2. Student will be able to interpret and illustrate formal communication.
3. It empowers students in choosing right lexical techniques for effective presentation
4. It equips the learner to analyze and list out things in logical order
5. The learner develops the ability to create and integrate ideas in a professional way.

Unit	Description	Instructional Hours
I	Getting to know people – Introduction – Talking about jobs (Present Simple) – Talking about working conditions(Adverb of Frequency) - Talking about company history and structure (Past simple, Prepositions of Time) – Talking about company activities (Connectors of addition and contrast, Present Continuous) – Focus on language – Parts of Speech – Gerund and Infinitives – Instruction-**General Vocabulary**.	12
II	Vocabulary practice – (Telephoning Leaving and taking messages) – requests and obligation – Describing trends (Adjectives and Adverbs) – Talking about company performance (present perfect and past simple, Reasons and consequences) – Reading Test Practice Describing products Dimensions, (Comparatives and Superlatives, Question formation) – Talking about product development (Sequencing words, Present continuous and going to) – Articles – Prepositions-Synonyms – Antonyms- Recommendations-**Interpretation of a chart**.	12
III	Talking about business equipment (Giving Instruction) – Letter Phrases- Writing Test Practice-Talking about facilities(Asking for and giving direction)- Presentation on a general topic -Talking about traffic and transport(making predictions)-**Discussion on current affairs**– Tenses- Present – Past-Future-Forms of verbs- Word techniques- Formation-Prefixes-Suffixes.	12
IV	Talking about conference arrangement(checking and confirming) – Talking about a conference before, after, when, until etc. – Listening Test Practice- talking about production process – passive-Talking about quality control Conditional 1 (real) (Making suggestions) – Itinery- Jumbled sentences- Paragraph writing- Essay writing – Checklist- Letter to Inviting Dignitaries – Accepting invitation- Declining Invitation.	12
V	Talking about call centers, insurance and changes in working practices (future possibility/probability)- Talking about banking- Speaking Test practice – Talking about delivery services (preposition of Time)- Talking about trading (Tense review)- Talking about recruitment conditional 2 (hypothetical) – talking about job applications (indirect questions) – Reading, Writing and Listening Test – Job application Letter and Resume Writing- Permission letters.	12
	Total Instructional Hours	**60**

Course Outcome

CO1 - Recognize different parts of speech for better usage.
CO2 - Interpret and illustrate formal communication
CO3 - Choosing right lexical techniques for effective presentation.
CO4 - Analyze and list out things in logical order.
CO5 - Create and integrate ideas in a professional way.

TEXT BOOKS:

T1 - Norman Whitby, Cambridge English: Business BENCHMARK Pre-intermediate to Intermediate – 2nd Edition. 2014.
T2 - Ian Wood and Anne Willams. "Pass Cambridge BEC Preliminary", Cengage Learning press 2013.

REFERENCE BOOKS :

R1 - Meenakshi Raman and Sangeetha Sharma. "Technical Communication-Principles and Practice", Oxford University Press, 2009.
R2 - Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi.2005
R3 - Kamalesh Sadanan "A Foundation Course for the Speakers of Tamil-Part-I &II", Orient Blackswan, 2010.

Chairman - BoS
EIE - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16GE1103	PROBLEM SOLVING AND PYTHON PROGRAMMING (COMMON TO ALL BRANCHES)	3	0	0	3

Course Objective

1. To know the basics of algorithmic problem solving
2. To read and write simple Python programs.
3. To develop Python programs with conditionals and loops.
4. To define Python functions and call them.
5. To use Python data structures – lists, tuples, dictionaries.
6. To do input/output with files in Python.

Unit	Description	Instructional Hours
I	**ALGORITHMIC PROBLEM SOLVING** Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudocode, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems:To find the greatest among three numbers, prime numbers,find minimum in a list, Towers of Hanoi.	9
II	**DATA, EXPRESSIONS, STATEMENTS** Python interpreter and interactive mode; values and types: int, float, boolean, string, and list;variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, compute Simple interest for a given amount, Factorial of a given number ,distance between two points.	9
III	**CONTROL FLOW, FUNCTIONS** Conditionals: Boolean values and operators, conditional (if), alternative (if -else), chained conditional (if –elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values,parameters, local and global scope, function composition, recursion; Strings: string slices,immutability, string functions and methods, string module; Lists as arrays. Illustrative programs:square root, gcd, exponentiation, sum an array of numbers, linear search,binary search.	9
IV	**LISTS, TUPLES, DICTIONARIES** Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing -list comprehension; Illustrative programs: selection sort, insertion sort,histogram.	9
V	**FILES, MODULES, PACKAGES** Files and exception: text files, reading and writing files, format operator; command line arguments,errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count,copy file.	9
	Total Instructional Hours	**45**

Course Outcome

CO1:Develop algorithmic solutions to simple computational problems
CO2:Structure simple Python programs for solving problems.
CO3:Decompose a Python program into functions.
CO4:Represent compound data using Python lists, tuples, dictionaries.
CO5:Read and write data from/to files in Python Programs.

TEXTBOOKS:

T1 –Ashok Namdev Kamthane ,Amit Ashok Kamthane ," Programming and Problem solving with Python" McGrawHill Education.
T2-Sheetal Taneja, "Python Programming A Modular Approach With Graphics,Database,Mobile and Web Applications, PEARSON .

REFERENCES:

R1 - Reema Thareja " Python Programming Using Problem Solvimg Approach " OXFORD.
R2-E.Balagurusamy, "Problem solving and Python Programming" McGrawHill Education.

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL Chairman HINDUSTHAN COLLEGE OF ENGG & TECH

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16ME1201	BASICS OF CIVIL AND MECHANICAL ENGINEERING (COMMON TO EIE AND EEE)	3	1	0	4

Course Objective

1. To impart basic knowledge on Civil and Mechanical Engineering.
2. To explain the materials used for the construction of civilized structures.
3. To make the understand the fundamentals of construction of structure.
4. To explain the component of power plant units and detailed explanation to IC engines their working principles.
5. To explain the R & AC system.

Unit	Description	Instructional Hours
I	**SURVEYING AND CIVIL ENGINEERING MATERIALS** **Surveying**: Objects – types – classification – principles – measurements of distances **Civil Engineering Materials:** Bricks – stones – sand – cement – concrete – steel sections-Woods-Plastics.	12
II	**BUILDING COMPONENTS AND STRUCTURES** **Foundations:** Types, Bearing capacity – Requirement of good foundations. **Superstructure:** Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Types of Bridges and Dams.	12
III	**POWER PLANT ENGINEERING** Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps– working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.	12
IV	**IC ENGINES** Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines.	12
V	**REFRIGERATION AND AIR CONDITIONING SYSTEM** Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.	12
		60
	Total Instructional Hours	

Course Outcome

CO1-Ability to explain the usage of construction material and proper selection of construction materials.
CO2-Ability to design building structures.
CO3-Ability to identify the components use in power plant cycle.
CO4-Ability to demonstrate working principles of petrol and diesel engine.
CO5-Ability to explain the components of refrigeration and Air conditioning cycle.

TEXT BOOKS:

T1 - Venugopal K. and Prahu Raja V., Basic Mechanical Engineering‖, Anuradha Publishers, Kumbakonam, 2000.
T2-Shanmugam G and Palanichamy M S, Basic Civil and Mechanical Engineering‖, Tata McGraw Hill Publishing Co., New Delhi, 1996.

REFERENCE BOOKS :

R1 - Ramamrutham S., Basic Civil Engineering, Dhanpat Rai Publishing Co. (P) Ltd. 1999.
R2-Seetharaman S., Basic Civil Engineering, Anuradha Agencies, 2005.
R3-Shantha Kumar S R J., Basic Mechanical Engineering, Hi-tech Publications, Mayiladuthurai.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL * Chairman * HINDUSTHAN COLLEGE OF ENGG & TECH

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16PS1001	PHYSICAL SCIENCES LAB - I (PHYSICS LABORATORY – I) (COMMON TO ALL BRANCHES)	0	0	2	1

Course Objective

1. Evaluate the particle size of micro particles and acceptance angle of fibres.
2. Employ instrumental method to determine Young's modulus of a beam of metals.
3. Apply the concept of diffraction and getting ability to calculate the wavelength of the mercury spectrum

Expt. No.	Description of the Experiments
1.	Determination of Wavelength, and particle size using Laser
2.	Determination of acceptance angle and numerical aperature in an optical fiber.
3.	Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
4.	Determination of wavelength of mercury spectrum – spectrometer grating
5.	Determination of thermal conductivity of a bad conductor – Lee's Disc method
6.	Determination of Young's modulus by Non uniform bending method
7.	Determination of specific resistance of a given coil of wire – Carey Foster's Bridge.
8.	Post office box Measurement of an unknown resistance

Total Practical Hours 30

Course Outcome

CO:1 Point out the particle size of micro particles and acceptance angle of fibres using diode laser.
CO:2 Assess the Young's modulus of a beam using non uniform bending methods.
CO:3 Illustrate the concept of diffraction and getting ability to calculate the wavelength of the mercury spectrum Using spectrometer.
CO:4 Identify the velocity of ultrasonic's in the given liquid.
CO:5 Illustrate phenomena of thermal conductivity of a bad conductor.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16PS1001	PHYSICAL SCIENCES LAB – I CHEMISTRY LAB – I (COMMON TO ALL BRANCHES)	0	0	2	1

Course Objective

1. Acquire practical skills in the determination of water quality parameters.
2. Acquaint the students with the determination of molecular weight of a polymer by viscometry.
3. Acquaint the students with the estimation of chemical substances using instrumental analysis techniques

Expt. No.	Description of the Experiments
1.	Preparation of molar and normal solutions and their standardization.
2.	Estimation of total, permanent and temporary hardness of Water by EDTA
3.	Determination of chloride content of water sample by argentometric method.
4.	Determination of available chlorine in bleaching powder.
5.	Conductometric titration of strong acid vs strong base (HCl vs NaOH).
6.	Conductometric titration (Mixture of weak and strong acids)
7.	Conductometric precipitation titration using $BaCl_2$ and Na_2SO_4
8.	Determination of molecular weight and degree of polymerization using viscometry.
9.	Estimation of iron content of the water sample using spectrophotometer.(1,10 phenanthroline / thiocyanate method).
	Total Practical Hours **30**

Course Outcome

CO1: Estimate the different types of hardness in a water sample.
CO2: Determine the chloride content of water sample.
CO3: Calculate the strength of acid using conductometric titrations.
CO4: Calculate the strength of strong and weak acid using conductometric titrations.
CO5: estimate the amount of salt using conductometric precipitation titrations.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL * Chairman * HINDUSTHAN COLLEGE OF ENGG & TECH

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16GE1002	ENGINEERING PRACTICES LABORATORY (COMMON TO ALL BRANCHES)	0	0	4	2

Course Objective: To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

Expt. No. — **Description of the Experiments**

I CIVIL ENGINEERING PRACTICE

Study of plumbing and carpentry components of Residential and Industrial buildings.

(A) PLUMBING WORKS:

1. Study on pipe joints, its location and functions: Valves, taps, couplings, unions, reducers, elbows in household fittings.
2. Study of pipe connection requirements for pumps.
3. Preparation of plumbing line sketches for water supply and sewage works.
4. Hands-on-exercise:
   - Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
5. Demonstration of plumbing requirements of high-rise buildings.

(B) CARPENTRY USING POWER TOOLS ONLY:

1. Study of the joints in roofs, doors, windows and furniture.
2. Hands-on-exercise in wood works by sawing, planning and cutting.

II MECHANICAL ENGINEERING

(A) Welding:

1. Preparation of arc welding of Butt joints, Lap joints and Tee joints

(B) Machining:

1. Practice on Simple step turning and taper turning
2. Practice on Drilling Practice

(C) Sheet Metal Work:

1. Practice on Models– Trays, cone and cylinder.

DEMONSTRATION

(D) Smithy

- Smithy operations: Upsetting, swaging, setting down and bending.
- Demonstration of – Production of hexagonal headed bolt.

(E) Gas welding

(F) Foundry Tools and operations.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGINEERING & TECHNOLOGY * Chairman

GROUP B (ELECTRICAL & ELECTRONICS)

S.No	Description of the Experiments
	ELECTRICAL ENGINEERING PRACTICES
1	Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2	Fluorescent lamp wiring
3	Stair case wiring.
4	Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5	Measurement of energy using single phase energy meter.
	ELECTRONICS ENGINEERING PRACTICES
1	Study of Electronic components and equipments – Resistors - colour coding
2	Measurement of DC signal - AC signal parameters (peak-peak, RMS period, frequency) using CRO.
3	Study of logic gates AND, OR, NOT and NAND .
4	Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5	Measurement of average and RMS value of Half wave and Full Wave rectifiers.
	Total Practical Hours **45**

Course Outcome

CO1: Fabricate wooden components and pipe connections including plumbing works.
CO2: Fabricate simple weld joints.
CO3: Fabricate electrical and electronics circuits.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16GE1003	VALUE ADDED COURSE I : LANGUAGE COMPETENCY ENHANCEMENT COURSE-I (COMMON TO ALL BRANCHES)	0	0	2	1

Topic No.	Description of the Experiments
1.	INTRODUCTION TO AERONAUTICAL ENGINEERING
2.	LEADERSHIP FOR ENGINEERS
3.	4G – NETWORK ESSENTIALS
4.	COMP. SCIENCE ESSENTIALS FOR SOFTWARE DEVELOPMENT
5.	INTRODUCTION ANALYTICS MODELLING
6.	MATERIAL SCIENCE AND ENGINEERING

Total Marks **100**

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16GE1004	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (COMMON TO ALL BRANCHES)	0	0	4	2

Course Objective

1. To write, test, and debug simple Python programs.
2. To implement Python programs with conditionals and loops.
3. Use functions for structuring Python programs.
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python.

Expt. No.	Description of the Experiments
1.	Compute the GCD of two numbers.
2.	Find the square root of a number (Newton's method)
3.	Exponentiation (power of a number)16
4.	Find the factorial of a given number
5.	Print prime numbers from 1 to n numbers
6.	Find the maximum of a list of numbers
7.	Linear search and Binary search
8.	Selection sort, Insertion sort
9.	Merge sort
10.	First n prime numbers
11.	Multiply matrices
12.	Programs that take command line arguments(word count)
13.	Find the most frequent words in a text read from a file
14.	Simulate elliptical orbits in Pygame
15.	Simulate bouncing ball using Pygame
	Total Practical Hours 45

Course Outcome

CO1:Use office packages for documentation and presentation
CO2:Implement program using control structures
CO3:Handle arrays and strings
CO4:Form heterogeneous data using structure and union

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGINEERING * Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16MA2102	ENGINEERING MATHEMATICS – II (VECTOR CALCULUS, COMPLEX VARIABLES AND LAPLACE TRANSFORMS) (COMMON TO ALL BRANCHES)	3	1	0	4

Course Objective

1. Learn the basics of vector calculus comprising gradient, divergence, Curl and line, surface, volume integrals.
2. Understand analytic functions of complex variables and conformal mappings.
3. Know the basics of residues, complex integration and contour integration.
4. Apply Laplace transform techniques to solve linear differential equations.
5. Know the effective mathematical tools for the solutions of partial differential equations that model several physical problems in mathematical physics.

Unit	Description	Instructional Hours
I	**VECTOR CALCULUS** Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.	12
II	**ANALYTIC FUNCTIONS** Analytic function - Cauchy-Riemann equations - sufficient conditions (excluding proof) – Harmonic - conjugate harmonic functions– Construction of analytic functions (Milne-Thompson method) – Conformal mapping: w = z+c, cz, 1/z and bilinear transformation without problems related to the concept of conformal mapping.	12
III	**COMPLEX INTEGRATION** Complex integration – Statements of Cauchy's integral theorem – Taylor's and Laurent's series expansions - Singular points – Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle.	12
IV	**LAPLACE TRANSFORM** Laplace transform –Basic properties – Transforms of derivatives and integrals of functions - Transforms of unit step function and impulse function – Transform of periodic functions. Inverse Laplace transform - Convolution theorem (with out proof) – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.	12
V	**PARTIAL DIFFERENTIAL EQUATIONS** Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions-Solution of standard types of first order partial differential equations of the form f(p,q) = 0, Clairaut's type: z = px + qy + f(p, q) – Lagrange's linear equation- Linear homogeneous partial differential equations of second and higher order with constant coefficient.	12
	Total Instructional Hours	**60**

Course Outcome

CO1: Know the gradient, divergence and curl of vectors useful for engineering application like fluid flow, electricity and magnetism.
CO2: Test the analyticity to construct the analytic function and transform complex functions from one plane to another plane graphically.
CO3: Evaluate real and complex integrals over suitable closed paths or contours.
CO4: Know the applications of Laplace transform and its properties and to solve certain linear differential equations using Laplace transform technique.
CO5: Solve the engineering problems using Partial Differential Equations.

TEXT BOOKS:

T1 - Ravish R Singh, Mukul Bhatt, "Engineeing Mathematics", McGraw Hill education (India) Private Ltd.,Chennai,2017.
T2 - Veerarajan T, "Engineering Mathematics–II", McGraw Hill Education(India) Pvt Ltd, New Delhi, 2016.

REFERENCE BOOKS :

R1 - Bali N.P & Manish Goyal, "A Text book of Engineering Mathematics", 8th Edition, Laxmi Pub. 2011
R2 - Grewal B.S, "Higher Engineering Mathematics", 42nd Edition, Khanna Publications, Delhi, 2012.
R3 - Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage learning,2012.
R4 - Sivarama Krishna Das P and Rukmangadachari E., "Engineering Mathematics" pearson publishing, 2011.
R5- Wylie & Barett, "Advanced Engineering Mathematics", McGraw Hill Education, 6th edition, 2003

Chairman - BoS
EIE - HiCET

Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16PH2102	PHYSICS OF MATERIALS (COMMON TO ALL BRANCHES)	3	0	0	3

Course Objective

1. Gain knowledge about conducting materials.
2. Provide fundamental knowledge of semiconducting materials which is related to the engineering program.
3. Extend the properties of magnetic materials, applications and super conducting materials.
4. Defend the various types of dielectric materials and their uses.
5. Expose the students to smart materials and the basis of nano technology.

Unit	Description	Instructional Hours
I	**CONDUCTING MATERIALS** Introduction – Conductors – Classical free electron theory of metals – Electrical and thermal conductivities – Wiedemann–Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi function – Density of energy states – Carrier concentration in metals.	9
II	**SEMICONDUCTING MATERIALS** Introduction – Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors –direct and indirect band gap of semiconductors- derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration — Hall effect –Determination of Hall coefficient – Applications	9
III	**MAGNETIC & SUPERCONDUCTING MATERIALS** **Magnetic Materials**: Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti ferromagnetic materials – Ferrites and its applications. **Superconducting Materials :** Superconductivity : properties(Messiner effect, effect of magnetic field, effect of current and isotope effects) – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.	9
IV	**DIELECTRIC & COMPOSITES MATERIALS** Introduction – Electrical susceptibility – dielectric constant – polarization - electronic, ionic, orientation and space charge polarization –internal field – Claussius – Mosotti relation (derivation) – dielectric loss and dielectric breakdown (qualitative) Introduction to composites materials – types of composites materials – polymer, metallic and ceramic matrix composites (qualitative). Application in surgery, sports equipment.	9
V	**SMART MATERIALS AND NANOTECHNOLOGY** **New Engineering Materials:** Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications. **Nano Materials**: Synthesis - plasma arcing – Chemical vapour deposition – properties of nanoparicles and applications. – Carbon nano tubes – fabrication – pulsed laser deposition - Chemical vapour deposition - properties & applications.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Illustrate the electrical / thermal conductivity of conducting materials.
CO2: Understand the purpose of the acceptor or donor levels and the band gap of a semiconductor.
CO3: Interpret the basic idea behind the process of magnetism and applications of magnetic materials in every day life
CO4: Identify and compare the various types of dielectric polarization and dielectric breakdown.
CO5: Evaluate the properties and applications of various advanced engineering materials and develop the new ideas to synthesis Nanomaterials

TEXT BOOKS:

T1 - S.O.Pillai "Solid State Physics" New Age International Publishers, New Delhi – 2011.
T2- Rajendran V "Materials Science" McGraw-Hill Education" New Delhi -2016.

REFERENCE BOOKS:

R1 - William D Callister, Jr "Material Science and Engineering" John wiley and Sons, New York, 2014.
R2 - Raghavan, V. "Materials Science and Engineering – A First Course" Prentice Hall of India, New Delhi 2016.
R3 -Dr. G. Senthilkumar "Engineering Physics – II" VRB publishers Pvt Ltd., 2013.

Chairman - BoS
EIE - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16CY2102	ENVIRONMENTAL SCIENCES	3	0	0	3

Course Objective

1. To gain knowledge on the importance of environmental education, ecosystem and biodiversity.
2. To acquire knowledge about environmental pollution – sources, effects and control measures of environmental pollution.
3. To find and implement scientific, technological, economic and political solutions to environmental problems.
4. To study about the natural resources, exploitation and its conservation
5. To be aware of the national and international concern for environment and its protection.

Unit	Description	Instructional Hours
I	**ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY** Importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers- energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.	9
II	**ENVIRONMENTAL POLLUTION** Definition – causes, effects and control measures of: Air pollution – Air pollution standards – control methods- Water pollution – Water quality parameters- Soil pollution - Marine pollution - Noise pollution- Thermal pollution - Nuclear hazards–role of an individual in prevention of pollution – pollution case studies.	9
III	**NATURAL RESOURCES** Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and Desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.	9
IV	**SOCIAL ISSUES AND THE ENVIRONMENT** From unsustainable to sustainable development – urban problems related to energy- energy conversion – electrical energy calculations- environmental ethics: Issues and possible solutions – 12 Principles of green chemistry- Current Environmental issues at Country level – management of municipal sewage, municipal solid waste, Hazardous waste and Bio-medical waste – Global issues –Climatic change, Acid rain, greenhouse effect and Ozone layer depletion. Disaster management: floods, earthquake, cyclone and landslides.	9
V	**HUMAN POPULATION AND THE ENVIRONMENT** Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA)- GIS-remote sensing-role of information technology in environment and human health – Case studies.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Understand the natural environment and its relationships with human activities.
CO2: Characterize and analyze human impacts on the environment
CO3: Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes
CO4: Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
CO5: Understand and implement scientific research strategies, including collection,

Chairman - BoS
EIE - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGINEERING & TECHNOLOGY * Chairman

Dean (Academics)
HiCET

management, evaluation, and interpretation of environmental data.

TEXT BOOKS:

T1 - Anubha Kaushik and C. P. Kaushik, "Environmental Science and Engineering", Fourth edition, New Age International Publishers, New Delhi, 2014.

T2 – Deeksha Dave and S.S.Katewa, "Textbook of Environmental Studies", Second Edition, Cengage Learning, 2012.

REFERENCES:

R1 - Trivedi R.K. "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.

R2 - G.Tyler Miller, Jr and Scott E. Spoolman"Environmental Science" Thirteenth Edition, Cengage Learning, 2010.

R3 - Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2004.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGINEERING & TECHNOLOGY *
Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16HE2102R	ESSENTIAL ENGLISH FOR ENGINEERS – II (COMMON TO ALL BRANCHES)	3	1	0	4

Course Objective

1. The learner will be introduced to global corporate culture and professional communication.
2. It helps the students to focus on organizing professional event and documentation.
3. The student will be able to describe the events and process in an effective way.
4. It trains the student to analyze the problems and to find solution to it.
5. The learner will be familiar with business communication.

Unit	Description	Instructional Hours
I	Introduction- talking about teamwork- Making arrangements- Improving Communication in spoken language – Taking and leaving Voice mail messages (present Tense, Past Tense and Present Perfect) Talking about Business Hotel- (Speaking Activity) Talking about Corporate Hospitality- Formal and Informal Language – Making accepting and declining invitations (Auxiliary Verb, Countable or Uncountable Nouns) – Focus on Language – Definitions and Extended Definitions-**Reading comprehension.**	12
II	Talking about orders – Clarity Written Language – Phone and Letter Phrases – Talking about Company Finances – Conditional 1 and 2 – Managing Cash Flow (Intention and Arrangements Conditional 1 and 2) – Talking about Brands and Marketing – Ethical Banking- Talking about Public Relations – Organizing a PR Event – Describing Duties and Responsibilities – (Future Tense and Articles) – Reported Speech – Modal Verbs and Passive, Impersonal Passive Voice-**interpretation of posters or advertisements.**	12
III	Talking about relocation – Report Phrases – Talking about Similarity and difference- Giving Directions- Asking for Information and Making Suggestions – Talking about Location (Comparatives and Superlatives, Participles) – Talking about Company Performances- Describing Trends – Describing Cause and Effect – Talking about Environmental Impact – Discussing Green Issues – Language of Presentations (Adjectives and Adverbs, Determiners)- Homophones – Homonyms- Acronyms-Abbreviations- British and American words.	12
IV	Talking about Health and Safety – Expressing Obligation- Discussing Regulations- Talking about personnel Problems – Passives – Talking about Problem at Work (modal Verbs, Passives)- Talking about Expenses Claims- Talking about Air Travel (Relative Pronoun, Indirect Questions) – **E-mail Writing - Note completion-** Transcoding.	12
V	Talking about staff Benefits- Talking about Appraisal Systems (gerunds and Infinitives, Reported Speech) – Talking about Marketing Disasters – Expressing hypothetical Situations- Talking about entering Foreign Market (Conditional 3, Grammar review) – Letter for calling quotations, Replying for quotations – Placing an order and Complaint and **reply to a complaint**.	12
	Total Instructional Hours	**60**

Course Outcome

CO1: Introduced corporate culture and professional communication.
CO2: It focused on organizing a professional event and its documentation.
CO3: Improved the ability to describe the events and process in an effective way
CO4: Trained to analyze the problems and to find solution to it.
CO5: Practiced to make business communication.

TEXT BOOKS:

T1 - Norman Whitby, Cambridge English: Business BENCHMARK Pre-intermediate to Intermediate – 2nd Edition. 2014.
T2 - Ian Wood and Anne Willams. "Pass Cambridge BEC Preliminary", Cengage Learning press 2013.

REFERENCE BOOKS :

R1 - Communication Skills for Engineers, Sunitha Misra & C.Murali Krishna, Pearson Publishers
R2 - Technical Communication, Daniel G. Riordan, Cengage learning publishers.
R3 - Kamalesh Sadanan "A Foundation Course for the Speakers of Tamil-Part-I &II", Orient Blackswan, 2010.

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16GE2102	ENGINEERING GRAPHICS (COMMON TO ALL BRANCHES)	2	0	4	4

Course Objective

1. To provide drafting skills for communicating the Engineering concepts and ideas.
2. To expose to BIS and International standards related to engineering drawings.

Unit	Description	Total Hours
I	**PLANE CURVES** Importance of engineering drawing, drafting instruments, drawing sheets – layout and folding, Lettering and dimensioning, BIS standards and scales. Geometrical constructions, Construction of ellipse, parabola and Hyperbola by eccentricity method, construction of cycloids and involutes of square and circle – Drawing of tangents and normal to the above curves.	15
II	**PROJECTIONS OF POINTS, LINES AND PLANE SURFACES** Introduction to Orthographic projections- Projection of points. Projection of straight lines inclined to both the planes, Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the planes by rotating object method (First angle projections only).	15
III	**PROJECTIONS OF SOLIDS** Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is perpendicular and inclined to one plane and objects inclined to both the planes by rotating object method.	15
IV	**SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES** Sectioning of simple solids with their axis in vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinder and cone. Development of lateral surfaces of truncated solids. Intersection of solids-cylinder vs cylinder.	15
V	**ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS** Isometric views and projections of simple and truncated solids such as - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions. Free hand sketching of multiple views from a pictorial drawing. Perspective projection of solids in simple position using visual ray method.	15
	Total Instructional Hours	**75**

Course Outcome

CO1: Draw the orthographic and isometric views of regular solid objects including sectional views.
CO2: Recognize the International Standards in Engineering Drawing practices.

TEXT BOOKS:

T1 - K.Venugopal, V.Prabu Raja, "Engineering Drawing, AutoCAD, Building Drawings", 5th Edition New Age International Publishers, New delhi 2016.
T2 - K.V.Natarajan, "A textbook of Engineering Graphics", Dhanalaksmi Publishers, Chennai.

REFERENCE BOOKS:

R1 - Basant Agrawal and C.M.Agrawal, "Engineering Drawing", Tata McGraw Hill Publishing Company Limited,New Delhi 2008.
R2 - K. R. Gopalakrishnan, "Engineering Drawing" (Vol. I & II), Subhas Publications, Bangalore, 1998.
R3 - M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson Education, India, 2005.
R4 - N.S. Parthasarathy, Vela Murali, "Engineering Drawing", Oxford University press, India 2015.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL * Chairman * HINDUSTHAN COLLEGE OF ENGG & TECH

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI2201	ELECTRICAL CIRCUIT THEORY (COMMON TO EIE AND EEE)	3	0	0	3

Course Objective

1. To analyze electric circuits and solve complex circuits
2. To impart knowledge on various network theorems in AC and DC circuits
3. To provide knowledge on resonance phenomenon and analyze coupled circuits
4. To analyze transient response of AC and DC inputs to RL.RC and RLC circuits
5. To draw phasor diagrams of voltage and current for three phase circuits and measure power and power factor.

Unit	Description	Instructional Hours
I	**BASIC CIRCUITS ANALYSIS** Ohm's Law – Kirchoff's laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and Node voltage method –Super Mesh-Super Node – Phasor Diagram – Power, Power Factor and Energy.	9
II	**NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS** Network reduction: voltage and current division, source transformation – Dependent sources and Independent sources - star delta conversion. Thevenin's and Norton & Theorem – Superposition Theorem – Maximum power transfer theorem –Reciprocity Theorem-Millman's Theorem.	9
III	**RESONANCE AND COUPLED CIRCUITS** Series and Parallel resonance – frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Dot rule for coupled circuits - Tuned circuits – Single tuned circuits.	9
IV	**TRANSIENT RESPONSE** Transient response of RL, RC and RLC Circuits using Laplace transform for DC input - Time constants - Transient response of A.C. circuits for single loop circuit.	9
V	**THREE PHASE CIRCUITS** Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected, balanced & unbalanced loads – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits using two wattmeter method.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Apply basic laws to electrical circuits.
CO2: Solve electrical circuits using network theorems
CO3: Explain the concept of resonance and solve coupled circuit problems
CO4: Carryout problems in DC and AC transients
CO5: Analyse and calculate three phase AC circuit parameters

TEXT BOOKS:

T1 - William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", Tata McGraw Hill publishers, 6th edition, New Delhi, 2003.

T2 - Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis",Tata McGraw Hill, 2007

REFERENCE BOOKS :

R1 - Paranjothi SR, "Electric Circuits Analysis," New Age International Ltd., New Delhi,(1996).

R2 - Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series,Tata McGraw-Hill, NewDelhi, 2001.

R3 - Chakrabati A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi, (1999).

R4 - Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition,McGraw Hill, (2003).

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E	16PS2001	PHYSICAL SCIENCES LABORATORY – II PHYSICS LAB – II (COMMON TO ALL BRANCHES)	0	0	2	1

Course Objective

1. Evaluate the band gap of a semiconductor.
2. Apply the concept of interference and calculate the thickness of thin wire.
3. Acquire the practical skills in Young's modulus by uniform bending method.

Expt. No.	Description of the Experiments
1.	Determination of Young's modulus by uniform bending method
2.	Determination of band gap of a semiconductor
3.	Determination of Coefficient of viscosity of a liquid –Poiseuille's method
4.	Determination of Dispersive power of a prism - Spectrometer
5.	Determination of thickness of a thin wire – Air wedge method
6.	Determination of Rigidity modulus – Torsion pendulum
7.	Magnetic hysteresis experiment.
8.	Calibration of ammeter using potentiometer

Total Practical Hours **30**

Course Outcome

CO: 1. Experiment involving the physical phenomena of the Rigidity modulus of wire.
CO: 2. Determine the band gap of a semiconductor and variation of Energy Gap (E_g)with temperature.
CO: 3 Assess the Young's modulus of a beam using non uniform bending method.
CO: 4. Explain the concept of interference and calculate the thickness of thin wire and other fine objects.
CO: 5. Experiment provides a unique opportunity to validate Dispersive power of a prism using Spectrometer.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG * Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E	16PS2001	PHYSICAL SCIENCES LAB II CHEMISTRY LAB – II (COMMON TO ALL BRANCHES)	0	0	2	1

Course Objective

1. Acquire practical skills in the quantitative analysis of water quality parameters.
2. Acquire practical skills in the instrumental methods for quantitative Estimation of metal ion content.
3. Gain knowledge in determination of rate of corrosion.

Expt. No.	Description of the Experiments
1.	Determination of Dissolved Oxygen in water by Winkler's method.
2.	Estimation of alkalinity of water sample by indicator method.
3.	Estimation of hydrochloric acid by pH metry.
4.	Estimation of ferrous iron by Potentiometry.
5.	Estimation of Copper by EDTA
6.	Determination of sodium by flame photometry
7.	Determination of corrosion rate of mild steel by weight loss method.
	Total Practical Hours 30

Course Outcome

CO1: Determine the level of DO in a water sample.
CO2: Identify and estimate the different types of alkalinity in water sample.
CO3: Estimate the acidity of water sample using pH metry.
CO4: Estimate the amount of copper in a brass sample.
CO5: Determine the metal ion content using instrumental methods.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI2001	ELECTRICAL CIRCUIT LABORATORY (COMMON TO EIE AND EEE)	0	0	4	2

Course Objective

1. To provide practical experience on verification of kirchoff's voltage law, kirchoff's current law and network theorems.
2. To design series and parallel resonant circuit and to analyse the simulation results.
3. To compare the time constant values of RL,RC circuits by conducting suitable experiments
4. To measure three phase power using two wattmeter method
5. To provide knowledge on signal measurements using CRO and DSO

S.No	Description of the experiments	Total Practical Hours
1.	Experimental verification of Kirchhoff's voltage and current laws	
2.	Experimental verification of network theorems (Thevenin's and Superposition).	
3.	Experimental verification of network theorems (Reciprocity Theorem and Maximum power transfer Theorem).	
4.	Experimental determination of time constant of RL & RC electric circuits.	
5.	Experimental determination of frequency response of RLC circuits.	
6.	Design and Simulation of series resonance circuit.	
7.	Design and Simulation of parallel resonant circuits.	
8.	Simulation of three phases balanced and unbalanced star, delta networks circuits.	
9.	Experimental determination of power in three phase circuits by two-watt meter method.	
10.	Study of CRO, DSO and measurement of sinusoidal voltage, frequency and power factor	
	Total Instructional Hours	**45**

Course Outcome

CO1: Verify ohm's law and Kirchoff's law
CO2: Understand and verify theorems
CO3: Perform mesh and nodal analysis
CO4:Understand transient response of RL,RC circuits for DC input
CO5: Evaluate frequency response of series, parallel resonant circuits and tuned circuits

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL
Chairman
HINDUSTHAN COLLEGE OF ENGG & TECH

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16GE2001	VALUE ADDED COURSE II :LANGUAGE COMPETENCY ENHANCEMENT COURSE-II (COMMON TO ALL BRANCHES)	0	0	2	1

Topic No.	Description of the Experiments
1.	A HANDS ON INTRODUCTION TO ENG. SIMULATIONS
2.	INTRODUCTION STEEL
3.	ENTREPRENEUR DEVELOPMENT
4.	DRINKING WATER TREATMENT
5.	MECHANICAL BEHAVIOR OF MATERIALS (LINEAR ELASTIC) (BEHAVIOR)
6.	FASCINATING WORLD OF ROBOTS AND ROBOTICS
	Total Marks 100

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL Chairman HINDUSTHAN COLLEGE OF ENGG. & TECH.

SYLLABUS

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16MA3103	FOURIER ANALYSIS AND STATISTICS (COMMON TO AERO, AUTO, MECH, EEE AND EIE)	3	1	0	4

Course Objectives

1. Introduce Fourier series analysis which is central to many applications in engineering.
2. Solve boundary value problems by applying Fourier series.
3. Acquaint with Fourier transform techniques used in wide variety of situations.
4. Provide the necessary basic concepts of some statistical methods.
5. Manipulate different kinds of problems occurring in engineering and technology by applying the design of experiments.

Unit	Description	Instructional Hours
I	**FOURIER SERIES** Dirichlet's conditions- General Fourier Series – Odd and Even Functions – Half range sine and cosine series – Change of Interval - Parseval's Identity - Harmonic analysis. A spring -mass system deriven by an alterating square force, A series circuit with a sqaure –wave voltage, power delievered by a periodic current and modelling radiation intensity.	12
II	**BOUNDARY VALUE PROBLEMS** Classification - solution of one dimensional wave equation — one dimensional heat equation — steady state solutions of two dimensional heat equations (excluding insulated edges) – Fourier series solution in cartesian coordinates.	12
III	**FOURIER TRANSFORMS** Fourier Transform Pairs - Fourier sine and cosine transforms – Properties - Transforms of Simple functions – Convolution Theorem – Parseval's identity.	12
IV	**TESTING OF HYPOTHESIS** Large sample test based on Normal distribution for single mean and difference of means – Tests based on t (for single mean and difference of means) - F distribution – for testing difference of variance, Chi – Square test for Contingency table (Test for Independency) – Goodness of fit.	12
V	**DESIGN OF EXPERIMENTS** One way and two way classifications - Completely randomized design – Randomized block design –Latin square design.	12
	Total Instructional Hours	**60 Hrs**

Course Outcomes

CO1: Understand the mathematical principles of Fourier series which would provide them the ability to formulate and solve some of the physical problems of engineering.
CO2: Acquire the knowledge of application of Fourier series in solving the heat and wave equations.
CO3: Obtain the knowledge of Fourier transform techniques which extend its applications in Electrical circuit analysis, control system design and signal processing.
CO4: Acquire skills in analyzing statistical methods.
CO5: Have a clear perception of the statistical ideas and demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.

TEXT BOOKS:

T1 - Veerarajan. T.,"Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., Secondreprint, New Delhi, 2012.

T2 - Gupta, S.C., & Kapoor, V.K., Fundamentals of Mathematical Statistics, Sultan Chand & Sons, Reprint 2011.

REFERENCE BOOKS :

R1 - C.Roy Wylie " Advance Engineering Mathematics" Louis C. Barret, 6th Edition, Mc Graw Hill Education India Private Limited, New Delhi 2003.

R2 - Kandasamy P., Thilagavathy K. and Gunavathy K.,"Engineering Mathematics Volume III", S.Chand& Company Ltd., New Delhi, 1996.

R3 - Walpole. R.E., Myers. R.H., Myers. S.L., and Ye. K., "Probability and Statistics for Engineersand Scientists", 8th Edition, Pearson Education, Asia, 2007.

Chairman - BoS
EIE - HiCET

Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI3201	ELECTRONIC INSTRUMENTATION	3	0	0	3

Course Objective

1. Describe the various analog electronic instruments and it's working
2. Classify signal generators and different types of wave analyzers
3. Illustrate cathode ray oscilloscope and display devices.
4. Explain about digital electronic instruments and its conversion techniques.
5. Outline smart instrumentation and measurements.

Unit	Description	Instructional Hours
I	**ELECTRONIC ANALOG METERS** A.C and D.C voltmeters - ammeter, multimeter - power meter - Q meter - true RMS meter - vector impedance meter - vector voltmeter - component measuring instruments - RF voltage and power measurements. AF oscillators - Instrument Transformers - Instrumentation amplifier.	9
II	**SIGNAL GENERATORS AND WAVE ANALYZERS** Sine wave generator - Frequency synthesized sine wave generator - Sweep frequency generator, pulse and square wave generator - Function generator - Noise generator - Applications. Wave analyzer: Types - Harmonic distortion analyzer - Spectrum analyzer.	9
III	**CATHODE RAY OSCILLOSCOPE, RECORDERS AND DISPLAYS** General purpose oscilloscope - Screens for CRT graticules - Vertical & horizontal deflection systems - Delay line - Multiple trace - Dual beam & dual trace - Probes - Storage oscilloscopes - Applications. X-Y Plotters, magnetic tape recording - Data loggers. Display devices: LED, LCD - Bar graph display - seven segments and dot matrix displays.	9
IV	**DIGITAL INSTRUMENTS** Digital Ammeter and Voltmeter - auto ranging, auto zeroing - Measurements of Frequency and Time Interval - DMM, DPM, Comparison between analog and digital techniques of measurement. Successive approximation and dual slope types of ADC - digital frequency counters - digital storage oscilloscopes - LCR meter.	9
V	**SMART INSTRUMENTS AND APPLICATIONS** Serial, parallel ports, USB–IEEE 802.15.4/ZigBee - Instruments used in computer controlled system - Digital Transducers - Smart/intelligent instruments, comparison with conventional type instruments - Role of measuring instruments and recorders in Industries - Applications of digital instruments.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Define the construction and working nature of A.C and D.C analog instruments.
CO2: Summarize the signal generators and analyzers for various parameter measurements.
CO3: Demonstrate the working of oscilloscope, recorders and display devices.
CO4: Implement digital measuring instruments for applications.
CO5: Build a computer controlled digital instruments and transducers for suitable industrial applications.

TEXT BOOKS:

T1 - Albert D. Helfrick and William D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall of India, 2008.
T2 - Kalsi.H.S, "Electronic Instrumentation", Tata McGraw Hill, 2010.

REFERENCE BOOKS:

R1 - Patranabis.D "Principles of Electronic Instrumentation", Prentice Hall of India Learning Pvt Ltd, 2009.
R2 - Rangan, C.S., Sarma G.R. and Mani V.S.V., "Instrumentation devices and systems", Tata McGraw Hill, New Delhi, 2008.
R3 - Kazem Sohraby, Daniel Minoli and Taieb Znati, "Wireless Sensor Networks - Technology, Protocols, and Applications" A John Wiley & Sons, Inc. Publications, 2007.

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL OF ENGG & TECH. Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI3202	ELECTRONIC DEVICES AND CIRCUITS (COMMON TO EIE AND EEE)	3	0	0	3

Course Objective

1. Recall the basics of electronic devices.
2. Interpret the structure, operation and characteristics of transistors.
3. Analyze various configurations of BJT amplifiers.
4. Infer the basic concepts of large signal amplifiers.
5. Interpret the operations of feedback amplifiers and oscillators.

Unit	Description	Instructional Hours
I	**SEMICONDUCTOR DIODE** PN Junction Diode - Structure, Operation and V-I Characteristics, Diode Current Equation, Application of Diode - Rectifiers: Half Wave and Full Wave Rectifier - Zener Diode: Characteristics, Application of Zener Diode	9
II	**TRANSISTORS** Junction transistor - BJT: CE, CB and CC configurations, Transistor Biasing Circuits - JFET: Output and Transfer Characteristics, Structure, Operation and Characteristics of MOSFET and UJT.	9
III	**DESIGN AND ANALYSIS OF SMALL SIGNAL AMPLIFIER** BJT - Transistor Modeling, Hybrid Equivalent Circuit, Small Signal Analysis - Low Frequency Model : CE,CB,CC amplifiers, Differential Amplifier - A.C and D.C Analysis, Single Tuned Amplifiers.	9
IV	**LARGE SIGNAL AMPLIFIERS** Classification of Power Amplifiers, Efficiency of Class A and Class B Amplifier Complementary - Symmetry, Push - Pull Power Amplifiers- Calculation of Power Output, Efficiency and Power Dissipation - Crossover Distortion.	9
V	**FEEDBACK AMPLIFIERS AND OSCILLATORS** Advantages of Negative Feedback - Voltage / Current, Series, Shunt Feedback - Positive Feedback - Condition for Oscillations, RC Phase Shift - Wien bridge, Hartley, Colpitts and Crystal Oscillators.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Apply the knowledge acquired about electronic devices.
CO2: Summarize the concepts of transistors.
CO3: Transform the acquired skill in designing an amplifier circuit.
CO4: Illustrate the working of large signal amplifiers.
CO5: Outline the concepts of feedback amplifiers, conditions for oscillation and types of oscillators.

TEXT BOOKS:

T1 - R.S.Sedha, "Applied Electronics" S.Chand Publications, 2008.
T2 - David A. Bell, "Electronic Devices and Circuits", 5th Edition, Prentice Hall of India, 2008.

REFERENCE BOOKS:

R1 - Rashid, "Micro Electronic Circuits" Thomson Publications, 1999.
R2 - Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2003.
R3 - Robert L. Boylestad, "Electronic Devices and Circuit Theory", Prentice Hall of India, 2002.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI3203	MEASUREMENTS AND INSTRUMENTATION (COMMON TO EIE AND EEE)	3	0	0	3

Course Objective

1. Recognize the fundamentals of measurement system.
2. Understand the instruments used for measuring electrical parameters.
3. Examine the D.C. and A.C. bridges.
4. Enumerate the data storage and display devices.
5. Describe the various transducers and data acquisition system.

Unit	Description	Instructional Hours
I	**CHARACTERISTICS, ERRORS AND STANDARDS OF INSTRUMENTS** Functional elements of an instrument - Static and dynamic characteristics - Errors in measurement - Statistical evaluation of measurement data - Standards and Calibration.	9
II	**MEASURING INSTRUMENTS** Principle – Construction - operation of Moving Coil and Moving Iron Instruments - Ammeters and Voltmeters - Single phase, three phase wattmeters and energy meters - Instrument transformers- Instruments for measurement of frequency and phase.	9
III	**COMPARISON METHODS OF MEASUREMENTS** D.C Bridges: Wheatstone - Kelvin double bride - AC bridges: Anderson bridge –Maxwell bridge and Schering bridge - D.C & A.C Potentiometers- Transformer ratio bridge - Self-balancing bridge.	9
IV	**STORAGE AND DISPLAY DEVICES** Introduction - Magnetic disk and tape recorders - XY Recorders- CRT display- Display storage oscilloscope - LED & LCD display - Inkjet and Dot matrix printer.	9
V	**TRANSDUCERS AND DATA ACQUISITION SYSTEMS** Classification of transducers- Resistive transducer - RTD and Strain gauge transducer, Capacitive transducers - Inductive transducers - LVDT- Piezoelectric transducer- Hall effect transducers - Elements of data acquisition - Smart sensor.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Illustrate the fundamentals of measurement system.
CO2: Analyze the instruments used for measuring electrical parameters.
CO3: Determine the circuit parameters (R, L, C and frequency) using bridges.
CO4: Describe the data storage and display devices.
CO5: Select and use various transducers and data acquisition system.

TEXT BOOKS:

T1 - Doebelin. E, "Measurement Systems: Application and Design", 6th Edition, Tata McGraw Hill Private Limited, 2012.
T2 - Sawhney. A.K, "A Course in Electrical and Electronics – Measurement and Instrumentation", 19th Edition, Dhanpat Rai & Sons, 2014.

REFERENCE BOOKS:

R1- D.V.S. Moorthy, "Transducers and Instrumentation", Prentice Hall of India Pvt Ltd, 2007.
R2 - H.S. Kalsi, "Electronic Instrumentation", Tata McGraw Hill, 2nd Edition 2004.
R3 - J. B. Gupta, "A Course in Electronic and Electrical Measurements", S. K. Kataria & Sons, 2003.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL OF ENGG & TECH Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI3204	TRANSDUCER ENGINEERING	3	0	0	3

Course Objective

1. Recall the fundamentals of measurement system.
2. Infer various resistive transducers operation with industrial parameters measurement.
3. Discuss the principle of working of various inductive transducers.
4. Apply the capacitive transducer working principle on industrial parameters measurement.
5. Illustrate the function of various miscellaneous transducers and sensors.

Unit	Description	Instructional Hours
I	**SIGNIFICANCE OF MEASUREMENT AND CHARACTERISTICS OF TRANSDUCER** Measurement system - Methods of measurements - Units and standards of measurement - Errors in measurement - Calibration methods - Statistical error analysis. Classification transducers - Characteristics of transducer - Mathematical model of transducer - Zero, First and Second order transducer - Response to impulse, step, ramp and sinusoidal inputs.	9
II	**RESISTIVE TRANSDUCERS** Resistance transducer - Principle of operation, construction, characteristics and application of potentiometer, strain gauge, thermocouple, Resistance Temperature Detector, thermostat, hot wire anemometer, moisture and humidity resistive transducer.	9
III	**INDUCTIVE TRANSDUCERS** Inductance transducer - Self and mutual inductive transducer- Principle of operation, construction, characteristics and application of LVDT, RVDT, synchro, variable reluctance transducer, eddy current transducer.	9
IV	**CAPACITIVE TRANSDUCERS** Capacitance transducer - Variable area type, variable air gap type - variable permittivity type; capacitive microphone - Frequency response - Applications (measurement of pressure, level, thickness, moisture and density).	9
V	**MISCELLANEOUS TRANSDUCERS AND SENSORS** Hall effect transducer-piezoelectric transducer - Magnetostrictive transducer - Digital transducer - Electrochemical transducer. Smart sensors - Proximity sensor - SQUID sensor - Biosensors - IC sensors - Safety sensor (Fire, smoke and gas leakage detection).	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Definition of errors, error analysis and characteristics response of different order transducers.
CO2: In-depth knowledge about resistive transducers.
CO3: Outline an adequate knowledge about various inductive transducers.
CO4: Make use of capacitive transducers on industrial parameters measurement.
CO5: Summarize the role of different industrial transducers and sensors.

TEXT BOOKS:

T1 - Sawhney. A.K, "A Course in Electrical and Electronics Measurements and Instrumentation", 19th Edition, Dhanpat Rai & Company Private Limited, 2004.
T2 - Renganathan. S, "Transducer Engineering", Allied Publishers, Chennai, 2003.

REFERENCE BOOKS:

R1 - Ernest O.Doebelin, "Measurement systems", 6th Edition, Tata McGraw Hill, New Delhi, 2011.
R2 - Patranabis. D, "Sensors and Transducers", Prentice Hall of India, 2003.
R3 - Patranabis. D, "Principles of Industrial Instrumentation", Tata McGraw Hill, New Delhi, 2010.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16ME3231	FUNDAMENTALS OF THERMODYNAMICS AND FLUID DYNAMICS	3	0	0	3

Course Objectives

1. To familiarize the students to understand the fundamentals of thermodynamics.
2. To acquire the knowledge and quantify the energy conversion.
3. To understand the energy degradation in thermodynamic systems.
4. To impart knowledge on the properties of fluids and its dimensions.
5. To learn about the performance of fluid machineries.

Unit	Description	Instructional Hours
I	**FUNDAMENTAL CONCEPTS & DEFINITIONS** Basic concepts - concept of continuum, comparison of microscopic and macroscopic approach. Path and point functions, state and processes. Intensive and extensive property, System and their types. Thermodynamic Equilibrium and Zeroth law of thermodynamics. Quasi-static, reversible and irreversible processes. Heat and work transfer, definition and comparison, sign convention. Displacement and other modes of work. Relationship between temperature scales, Modes of heat transfer.	9
II	**FIRST LAW OF THERMODYNAMICS** Closed system: Constant pressure, constant volume, constant temperature, adiabatic and polytropic process, P-V diagram. Steady flow energy equation - Open systems: Turbines, pumps, nozzles, boiler and heat exchanger.	9
III	**SECOND LAW OF THERMODYNAMICS AND BOILERS** Statements of second law and its corollaries - Heat Reservoir, source and sink- Heat Engine, Refrigerator and Heat pump. Steam Boilers and its types, Mountings and accessories of boilers.	9
IV	**FLUID PROPERTIES AND DIMENSIONAL ANALYSIS** Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, surface tension, capillarity, vapour pressure and cavitation - Pressure and flow measuring instruments. Dimensions, Dimensional homogeneity, methods of dimensional analysis-Rayleigh and Buckingham's-π theorem.	9
V	**FLUID MACHINES** Classification of fluid machines- Fans, blowers, pumps, Turbines and compressors - working principle.	9
	Total Instructional Hours	**45**

Course Outcome

Upon completion of this course, the students will be able to:
CO1: Apply the thermodynamic Principles on its applications.
CO2: Solve the processes in Closed and open systems.
CO3: Calculate the performance of engine, refrigerator, and heat pump.
CO4: Develop skills in the properties of fluids and its dimensions.
CO5: Analyze the working and performance of various hydraulic machineries.

TEXT BOOK:

T1 – Nag P.K., "Basic and Applied Thermodynamics", 2nd Edition, Tata McGraw Hill Publication, 2002.
T2 - Claus Borgnakke and Richard E.Sonntag, "Fundamentals of thermodynamics", 7th Edition, John Wiley & sons, 2009.

REFERENCES:

R1 - Rajput R.K, "Thermal Engineering", 3rd Edition, Laxmi Publication, Delhi, 2012.
R2 - Yahya S.M., "Turbines, Compressors and Fans", 4th Edition, McGraw-Hill Education 2011.
R3 - Bansal R.K., —Fluid Mechanics and Hydraulic Machines, 9th Ed, Laxmi Publications, Delhi, 2015.

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL Chairman HINDUSTHAN COLLEGE

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI3001	TRANSDUCER AND MEASUREMENTS LABORATORY	0	0	4	2

Course Objective

1. Analyze the suitable instruments to meet the requirements of industrial applications.
2. Infer the various techniques of resistance, capacitance and inductance measurements.
3. Assess the concept of calibration technique in various measuring instruments.

Expt. No.	Description of the Experiments
1.	Characteristics of a Potentiometric transducer.
2.	Characteristics of Strain gauge and Load cell.
3.	Temperature Characteristics of a. Thermocouple. b. Thermistor. c. RTD.
4.	Characteristics of LVDT.
5.	Characteristics of Photoelectric tachometer.
6.	Characteristics of Hall effect transducer.
7.	Measurement of resistance using a. Wheatstone bridge. b. Kelvin's bridge.
8.	Measurement of Capacitance using Schering Bridge.
9.	Measurement of Inductance using Anderson Bridge.
10.	Calibration of Ammeter and Voltmeter using Student type Potentiometer.
11.	Calibration of Single-phase Energy meter and Wattmeter.
12.	Study of Smart Transducers.
	Total Practical Hours **45**

Course Outcome

CO1: Make use of sensors and transducers to measure the industrial parameters.
CO2: Represent the designing knowledge in signal conditioning circuits.
CO3: Analyze the characteristics of different transducers.
CO4: Discuss the various techniques of passive element measurements.
CO5: Impart knowledge to the students in handling the different kinds of transducers which they often meet in different aspects of transducers.

Chairman - BOS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI3002	ELECTRONIC DEVICES AND CIRCUITS LABORATORY (COMMON TO EIE AND EEE)	0	0	4	2

Course Objective

1. Apply the knowledge gained in designing basic electronic circuits
2. Design feedback amplifiers and oscillators
3. Infer the working of cathode ray oscilloscope

Expt. No.	Description of the Experiments
1.	Characteristics of a. Semi conductor diode b. Zener diode
2.	Single Phase half-wave rectifiers with filters
3.	Single Phase full wave rectifiers with filters
4.	Characteristics of Transistor under a. Common Emitter Configuration b. Common Collector Configuration c. Common Base Configurations
5.	Characteristics of JFET and UJT
6.	Design of Relaxation Oscillator
7.	Design and Frequency response characteristics of a Common Emitter amplifier
8.	Design of Feedback Amplifier-Current series
9.	Design of transistor RC phase shift oscillator
10.	Characteristics of photo diode and photo transistor, study of light activated relay circuit
11.	Realization of first order passive filters
12.	Study of CRO and DSO for phase and frequency measurements
	Total Practical Hours 45

Course Outcome

CO1: Analyze about the characteristics of semiconductor devices
CO2: Experiment the working of rectifier
CO3: Design various electronic circuit configurations
CO4: Demonstrate the frequency response of amplifiers
CO5: Examine the design of current series feedback amplifier and RC phase shift oscillator

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL * Chairman * HINDUSTHAN COLLEGE OF ENGG & TECH

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16MA4107	NUMERICAL METHODS (COMMON TO AERO, AUTO, MECH, EEE &EIE)	3	1	0	4

Course Objective

1. Solve algebraic, transcendental and system of linear equations by using various techniques.
2. Apply various methods to find the intermediate values for the given data.
3. Be Familiar with the concepts of numerical differentiation and numerical integration of the unknown functions.
4. Understand the concept of solving ordinary differential equations by applying single and multi-step methods.
5. Appraise the methods introduced in the solution of ordinary differential equations and partial differential equations.

Unit	Description	Instructional Hours
	SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS	
I	Solution of equation – Fixed point iteration : x = g(x) method – Newton-Raphson method – Solution of linear system by Gauss Elimination and Gauss Jordan method – Iterative method : Gauss seidel method.	12
	INTERPOLATION	
II	Interpolation: Newton's forward and backward difference formulae – Lagrangian interpolation for unequal intervals – Divided difference for unequal intervals : Newton's divided difference formula.	12
	NUMERICAL DIFFERENTIATION AND INTEGRATION	
III	Differentiation using interpolation formula – Newton's forward and backward interpolation formulae for equal intervals – Newton's divided difference formula for unequal intervals - Numerical integration by Trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Double integration using Trapezoidal and Simpson's rules	12
	INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS	
IV	Single step methods: Taylor's series method – Euler and Modified Euler methods for first order equation – Fourth order Runge- kutta method for solving first order equations – Multi step method: Milne's predictor and corrector method and Adam – Bash forth predictor corrector method.	12
	BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS	
V	Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional Wave equation – Two dimensional Heat equations – Laplace and Poisson Equations.	12
	Total Instructional Hours	**60**

Course Outcome

CO1: Solve the system of linear algebraic equations representing steady state models and non linear equations arising in the field of engineering.
CO2: Understand the concept of interpolation in both cases of equal and unequal intervals.
CO3: Express the information from discrete data set through numerical differentiation and summary information through numerical integration.
CO4: Classify and solve ordinary differential equations by using single and multi step methods.
CO5: Acquire knowledge of finding the solution of ordinary and partial differential equations which are useful in attempting any engineering problems.

TEXT BOOKS:

T1 Sankara Rao K, "Numerical Methods for Scientists and Engineers", 3rd edition, Prentice Hall of India Private limited, New Delhi,2007.

T2 M.K.Jain,S.R.K.Iyengar, R.K.Jain "Numerical methods for Scientific and Computation", Fifth Edition, New Age International publishers 2010.

REFERENCE BOOKS:

R1 Kreyszig.E. "Advanced Engineering Mathematics", Eight Edition, John Wiley and sons (Asia) limited.

R2 Grewal B.S. and Grewal J.S. " Numerical Methods in Engineering and Science ", 6th Edition , Khanna publishers, New Delhi 2004.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

Programme B.E.	Course Code	Name of the Course	L	T	P	C
	16EI4201	ELECTRICAL MACHINES	3	0	0	3

Course Objective

1. Understand the principles of operations of electrical machines
2. Define the construction details of transformers
3. Understand the construction of AC electrical machines
4. Draw the phasor diagram of various machines
5. Introduce special electrical machines

Unit	Description	Instructional Hours
I	**D.C. MACHINES** D.C. Generator - Principle of operation and construction of DC generator - EMF equation - Characteristics - Armature reaction - Commutation. D.C. Motor - Types - Torque equation - Characteristics - Starting and speed control D.C. Motor	9
II	**TRANSFORMERS** Principle - Theory of ideal transformer - EMF equation - Construction details of shell and core type transformers - Tests on transformers - Equivalent circuit - Phasor diagram - Introduction to three-phase transformer connections.	9
III	**SYNCHRONOUS MACHINES** Synchronous Generator - Principle of operation and construction - types - EMF Equation - Vector diagram. Synchronous motor- Starting Methods - Torque equation - V curves - Speed control - Hunting	9
IV	**INDUCTION MACHINES** Three-phase Induction motor - principle of operation - Types - Torque-slip and Torque-speed characteristics - Starting methods and Speed control of induction motors. Introduction to induction generators.	9
V	**SINGLE PHASE INDUCTION MOTOR AND SPECIAL ELECTRICAL MACHINES (QUANTITATIVE TREATMENT ONLY)** Single phase induction motors - Double field revolving theory - Capacitor start capacitor run motors - Shaded pole motor - Repulsion type motor - Universal motor - Hysteresis motor - Permanent magnet synchronous motor - Switched reluctance motor - Brushless D.C motor - Stepper motor.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: State the principle of operation and construction of D.C. machines
CO2: Ability to write the transformers operation and construction
CO3: List the operation of synchronous machines
CO4: Explain the operation and control of induction machines
CO5: Illustrate the operation of special electrical machines

TEXT BOOKS:

T1 - Kothari D. P. and Nagrath I. J, "Electric Machines", Fourth Edition, McGraw Hill Education (India) Private Limited, 2015.
T2 - Deshpande M. V., "Electrical Machines", Prentice Hall of India Learning Pvt. Ltd., New Delhi, 2011.

REFERENCE BOOKS :

R1 - M.N.Bandyopadhyay, "Electrical Machines Theory and Practice", Prentice Hall of India Learning Pvt. Ltd., New Delhi, 2009.
R2 - B.L.Theraja and A.K.Theraja, "A Text Book of Electrical Technology" Volume II, S.Chand and Company, 2013.
R3 - C.A.Gross, "Electric Machines", CRC Press 2010.

Chairman - BoS
EIE - HiCET

Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI4202	LINEAR INTEGRATED CIRCUITS AND APPLICATIONS (COMMON TO EIE AND EEE)	3	0	0	3

Course Objective

1. Infer adequate knowledge on IC fabrication procedure.
2. Relate the characteristics of linear integrated circuits and their applications.
3. Apply OP-AMP on various applications like Timers, PLL circuits, ADC and DAC.
4. Impart the basic knowledge of regulator circuits and special function ICs.
5. Summarize internal functional blocks of special function ICs.

Unit	Description	Instructional Hours
I	**IC FABRICATION** IC classification - chip size and circuit complexity - fundamental of monolithic IC technology - Silicon wafer preparation - Epitaxial growth - Oxidation - Masking and Etching - diffusion of impurities - Assembly Processing and packaging - Fabrication of Diode and FET.	9
II	**CHARACTERISTICS OF OP-AMP** Basic information of OP-AMP - Ideal OP-AMP characteristics - DC characteristics - AC characteristics - frequency response of OP-AMP - Slew Rate - differential amplifier - Basic applications of OP-AMP - Inverting and Non-inverting Amplifiers- summer - differentiator and integrator - V/I and I/V converters.	9
III	**APPLICATIONS OF OP-AMP** Instrumentation amplifier - First order LPF - First order HPF - First order Band pass and Band reject filters - Comparators - multivibrators - waveform generators - clippers - clampers - peak detector- S/H circuit - D/A converter : R- 2R ladder and weighted resistor types - A/D converters : Duel Slope, Successive Approximations.	9
IV	**SPECIAL IC's** Functional block- characteristics and application circuits with IC 555 Timer - Application: Missing pulse detector, PWM, FSK Generator, PPM,SCHMITT Trigger - IC566 voltage controlled oscillator - IC565 - Phase Lock Loop IC - PLL application: frequency multiplication/division, AM Detection.	9
V	**APPLICATION IC's** IC voltage regulators - LM78XX - 79XX Fixed voltage regulators - LM317 - 723 Variable voltage regulators - switching regulator - LM 380 power amplifier - IC8038 function generator - Opto Coupler IC's.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Interpret the IC fabrication procedure.
CO2: Analyze the characteristics of operational amplifiers.
CO3: Outline the applications of OP-AMP.
CO4: Understand the working principle of special IC's.
CO5: Outline the function of voltage regulator as special IC's.

TEXT BOOKS:

T1 - D.Roy Choudhary, Sheil B.Jani, "Linear Integrated Circuits", Second Edition, New Age International Pvt. Ltd, 2003.
T2 - S.Salivahanan & V.S. Kanchana Bhaskaran, "Linear Integrated Circuits", Tata McGraw Hill, 2008.

REFERENCE BOOKS:

R1 - Ramakant A.Gayakward, "Op-amps and Linear Integrated Circuits", Fourth Edition, Prentice Hall of India Learning Pvt. Ltd 2000.
R2 - Robert F.Coughlin, Fredrick F. Driscoll, "Op-amp and Linear ICs", Prentice Hall of India Learning Pvt. Ltd, 6th Edition, 2012.
R3 - Floyd, Buchla, "Fundamentals of Analog Circuits", Pearson Education, 2013.

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL * ENGG & TECH * Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI4203	DIGITAL LOGIC CIRCUITS (COMMON TO EIE AND EEE)	3	0	0	3

Course Objective

1. Recall the basic number systems, codes and logical gates.
2. Infer the Boolean algebra and minimization logic.
3. Design combinational circuits.
4. Outline the design of synchronous and asynchronous sequential circuits.
5. Write a VHDL Coding for digital circuits

Unit	Description	Instructional Hours
I	**DIGITAL SYSTEM** Binary Numbers - Octal - Hexa Decimal and other base numbers - Number base conversions - complements - signed binary numbers - Floating point number representation - binary codes - error detecting and correcting codes - digital logic gates - Boolean algebra - basic theorems - Boolean functions - canonical and standard forms	9
II	**MINIMIZATION OF LOGIC CIRCUITS** Gate - Level Minimization and combination circuits - K-Map Methods - Three Variable - Four Variable - Five Variable - sum of products - product of sums Simplification - Don't care conditions - NAND and NOR implementation and other two level implementation.	9
III	**COMBINATIONAL LOGIC CIRCUITS** Design Procedure - Combinational circuit for different code converters and other problems - Binary Adder - subtractor - Multiplier - Magnitude Comparator - Decoders - Encoders - Multiplexers - Demultiplexers	9
IV	**SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL CIRCUITS** Latches - Flip-flops - analysis of clocked sequential circuits - design of counters – Up counters -Down counters - Ripple counters - Registers - Shift registers - Synchronous Counters - Asynchronous Sequential Circuits: Reduction of state and flow tables - Race free state assignment	9
V	**VHDL AND PROGRAMMABLE LOGIC DEVICES** RTL Design - combinational logic - Sequential circuit - Operators - Introduction to Packages - Subprograms - Test bench. (Simulation / Tutorial Examples: adders, counters, flip-flops, FSM, Multiplexers / Demultiplexers) - Introduction to Programmable Logic Devices: PROM - PLA - PALS	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Apply knowledge of various number systems and simplify the logical expressions using Boolean functions.
CO2: Evaluate the concepts and minimization of logic circuits.
CO3: Develop combinational circuits.
CO4: Design and analysis of synchronous and asynchronous sequential circuits.
CO5: Build VHDL program for adders, counters, flip-flops, FSM, Multiplexers / De-multiplexers.

TEXT BOOKS:

T1 - Raj Kamal, ' Digital systems-Principles and Design', Pearson Education 2nd edition, 2007.
T2 - M. Morris Mano, 'Digital Design with an introduction to the VHDL', Pearson Education 2013.

REFERENCE BOOKS:

R1 - Anand Kumar, "Fundamentals of Digital Circuits, Prentice Hall of India, 2013.
R2 - John F.Wakerly, 'Digital Design Principles and Practices", 4th edition , Prentice Hall of India Learning Private Ltd 2006.
R3 - Albert Paul Malvino Donald P.Leach,"Digital Principles and Applications, 4th edition, Tata Mc Graw-Hill 1994.

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL * Chairman * HINDUSTHAN COLLEGE OF ENGG & TECH

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI4204	POWER PLANT INSTRUMENTATION	3	0	0	3

Course Objective

1. Discuss the types of various methods of power generation.
2. Analyse the parameter for monitoring and controlling power plant.
3. Distinguish the various control loops available in boiler.
4. Discuss the operation of turbines and various control methods.
5. Interpret the operation of nuclear power plants.

Unit	Description	Instructional Hours
I	**METHODS OF POWER GENERATION** Power generation - types - importance of instrumentation in power generation - basic building block for all types of power generation plants – Piping and Instrumentation diagram (P&I)- cogeneration.	9
II	**PARAMETERS OF POWER PLANT AND ITS MEASUREMENT** Electrical and non electrical parameter measurement - correction factor for steam temp and steam pressure - drum level measurement - radiations detector - smoke density measurement - dust monitor - speed vibration, shell temperature monitoring and control.	9
III	**CONTROL LOOPS IN BOILER** Combustion Control-air/fuel ratio control - furnace draft control - main steam and reheat steam temperature control - super heater control - attemperator - deaerator control - distributed control system in power plants - Furnace safety interlocks and interlocks in boiler operation. Trimming of combustion air - Soot blowing. Burner management - Coal pulverizer control - Boiler types	9
IV	**TURBINE MONITORING AND MEASUREMENT** Types of steam turbines - Turbine protection measurement - Speed measurement - Free governor mode operation - Automatic Load-Frequency Control - Turbine oil system - Oil pressure drop relay - Oil cooling system - Turbine run up system.	9
V	**RENEWABLE POWER GENERATION** Solar energy resource - Solar sites and land resources - Solar power generation technologies - Solar thermal power generation - Photovoltaic devices - Cost of solar power - Wind resources - Wind turbine technology - Wind turbine anatomy - Offshore wind turbine technology - Wind farms - Environmental effects of wind power - Wind intermittency and grid issues - Wind capacity limits – Repowering - Cost of wind power	9
	Total Instructional Hours	**45**

Course Outcome

CO1 : Outline the various methods of power generation.
CO2 : Correlate the important measurement of various parameters instruments associated with power plants.
CO3 : Identify the appropriate control loop in boilers.
CO4 : Appraise the process involved in the operation of turbines.
CO5 : Outline the operation of nuclear power plants.

TEXT BOOKS:

T1 - Jain. R.K, "Mechanical and Industrial Measurements", Khanna Publishers, New Delhi, 1995.
T2 - Sam Dukelow. G "The control of Boilers", Instrument Society of America, 1991.

REFERENCE BOOKS :

R1 - Elonka. S.M and Kohan. A.L, "Standard Boilers Operations", McGraw Hill, New Delhi, 1994.
R2 - S.N. Singh, "Electrical Power Generation, Transmission and Distribution", Prentice Hall of India, 2011.
R3 - Chattopadhyay. P , " Boiler Operation Engineering", Tata McGraw Hill Education, 2000.

Chairman - BoS
EIE - HiCET

HINDUSTHAN COLLEGE OF ENGG & TECH ACADEMIC COUNCIL Chairman

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI4205	INDUSTRIAL INSTRUMENTATION-I	3	0	0	3

Course Objective

1. Infer the concepts of Speed, Force and Torque measurements in instrumentation.
2. Discuss the methods of Acceleration, Vibration, Density and Viscosity measurements.
3. Illustrate various pressure measurement instruments.
4. Demonstrate various temperature measuring instruments.
5. Outline the methods used for the measurement of temperature.

Unit	Description	Instructional Hours
I	**MEASUREMENT OF SPEED, FORCE AND TORQUE** Speed - Measurement of speed - moving iron and moving coil type - AC and DC tacho generators, photo electric pickup - stroboscope - Force - Measurement of force - Load cell, pneumatic and hydraulic load cell - Torque - Measurement of torque - Strain gauge, relative regular twist.	9
II	**MEASUREMENT OF ACCELERATION, VIBRATION, DENSITY AND VISCOSITY** Accelerometers - LVDT, piezoelectric, and variable reluctance type accelerometers Mechanical type vibration instruments - Seismic instrument as an accelerometer and vibrometer - Calibration of vibration pick-ups Units of density, specific gravity and viscosity used in industries - Baume scale, API scale - Pressure head type densitometer - Float type densitometer - Ultrasonic densitometer - Bridge type gas densitometer - Viscosity terms - Saybolt viscometer Rotameter type.	9
III	**MEASUREMENT OF PRESSURE** Units of pressure - Manometers - different types - Elastic type pressure gauges - Bourdon tube, bellows, diaphragms - Electrical methods - Measurement of vacuum-McLeod gauge, thermal conductivity gauges, Ionization gauge - flapper-nozzle assembly, Dead weight tester - Calibration and selection of pressure gauges.	9
IV	**MEASUREMENT OF TEMPERATURE** Temperature scales - bimetallic thermometer - filled-in thermometer - Electrical method of measurement - RTD - 3wire and 4 wire RTD, Thermistor, Thermocouples, laws of thermocouple, cold junction compensation, special techniques for measuring high temperature using thermocouples - thermal well - Radiation methods of temperature measurement - Pyrometers - radiation pyrometer and optical pyrometers - Calibration and selection of thermal sensing meters.	9
V	**THERMOCOUPLE AND RADIATION PYROMETER** Thermocouples - Laws of thermocouple, Fabrication of industrial thermocouples, Signal conditioning for thermocouple, isothermal block reference junctions, Commercial circuits for cold junction compensation, Response of thermocouple, Special techniques for measuring high temperature using thermocouple, Radiation fundamentals, Radiation methods of temperature measurement, Total radiation pyrometers, Optical pyrometers, Two colour radiation pyrometers - Fiber optic sensor for temperature measurement.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Interpret the measurement of Speed, Force and Torque in instrumentation
CO2: Classify the Instruments used for measurement of Acceleration, Vibration, Density and Viscosity
CO3: Choose the instruments used for the measurement of pressure
CO4: Design temperature measuring instruments
CO5: Identify the methods used for the measurement of temperature

TEXT BOOKS:

T1 - E.O. Doebelin, "Measurement Systems – Application and Design", Tata McGraw Hill Ltd., 2003.
T2 - R.K. Jain, "Mechanical and Industrial Measurements", Khanna Publishers, New Delhi, 1999.

REFERENCE BOOKS :

R1 - D. Patranabis, "Principles of Industrial Instrumentation", Tata McGraw Hill Ltd.,1996.
R2 - A.K. Sawhney and P. Sawhney, "A Course on Mechanical Measurements, Instrumentation and Control", Dhanpat Rai and Co, 2004.
R3 - S.K. Singh, "Industrial Instrumentation and Control", Tata McGraw Hill, 2003.

Chairman - BoS
EIE - HiCET

HINDUSTHAN ACADEMIC COUNCIL Chairman HINDUSTHAN COLLEGE OF ENGG & TECH

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI4001	ELECTRICAL MACHINES LABORATORY	0	0	4	2

Course Objective

1. Apply the knowledge gained to conduct load test on D.C machines.
2. Exposed to the load test on single and three phase induction motor.
3. Familiar with the operation of starters.

Expt. No.	Description of the Experiments
1.	a. Open circuit characteristics of D.C. shunt generator. b. Load characteristics of D.C. shunt generator
2.	Load test on D.C. shunt motor.
3.	Load test on D.C. series motor.
4.	Load test on D.C. Compound motor.
5.	Swinburne's test
6.	Speed control of D.C. shunt motor.
7.	Load test on single phase transformer
8.	a. Open circuit test on single phase transformer b. Short circuit test on single phase transformer
9.	Load test on single phase induction motor.
10.	Load test on three phase induction motor.
11.	a. No load test on three phase induction motor b. Blocked rotor test on three phase induction motor
12.	Study of starters

Total Practical Hours **45**

Course Outcome

CO1: Demonstrate the principle of DC generators, DC motors.
CO2: Explain the principle and to conduct test on transformers.
CO3: Validate suitable test to compute the characteristics of motors.
CO4: Establish suitable experiments on generators.
CO5: Demonstrate about starting methods of motors.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

ACADEMIC COUNCIL ★ HINDUSTHAN COLLEGE OF ENGINEERING & TECHNOLOGY ★ Chairman

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EI4002	LINEAR AND DIGITAL INTEGRATED CIRCUIT LABORATORY (COMMON TO EIE AND EEE)	0	0	4	2

Course Objective

1. Impart the knowledge on Boolean function, code converter and D to A.
2. Analyze the functions of encoder and decoder, multiplexer and shift register.
3. Design the functions and characteristics of Op- amp.

S.No	Description of the Experiments
	DIGITAL LOGIC CIRCUITS
1.	Implementation of Boolean Functions, Adder/ Subtractor circuits.
2.	Code converters: Excess-3 to BCD and Binary to Gray code converter and vice-versa.
3.	Encoders and Decoders.
4.	Multiplexer and De-multiplexer.
5.	Shift Register and Ring Counter.
	ANALOG CIRCUITS
6.	Astable and Monostable multivibrator and using IC 555 timer
7.	Performance characteristics of Op-amp IC.
8.	D/A and A/D Converter.
9.	Application of Op-Amp: Inverting and Non-Inverting amplifier.
10	Application of Op-Amp: Adder and Subtractor.
11.	Application of Op-Amp: Differential amplifier, Integrator and Differentiator
12.	Study of VCO and PLL ICs.
	Total Practical Hours 45

Course Outcome

CO1: Implement the Boolean function and analyze the performance of code conversion.
CO2: Evaluate the functions of D to A converter, encoder and decoder.
CO3: Understand the performance of multiplexer, shift register and ring counters.
CO4: Analyze the performance of Op-amp IC.
CO4: Assimilate the knowledge on VCO and PLL ICS.

Chairman - BoS
EIE - HiCET

Dean (Academics)
HiCET

ACADEMIC COUNCIL * HINDUSTHAN * Chairman

Hindusthan College of Engineering And Technology
Approved by AICTE, New Delhi, Accredited with 'A' Grade by NAAC
(An Autonomous Institution, Affiliated to Anna University, Chennai)
Coimbatore - 641032

DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING

ACDEMIC YEAR 2017-2018

REGULATIONS 2016

CO'S, PO'S & PSO'S MAPPING

SEMESTER I

16MA1101-Engineering Mathematics-I

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO2	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO3	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO4	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO5	3	3	3	2	2	-	-	-	-	-	-	2	2	2
Avg	3	3	3	2	2	-	-	-	-	-	-	2	2	2

16PH1101-Engineering Physics

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	3	2	3	3	-	-	-	-	-	-	1	1
CO2	3	2	3	3	3	-	-	-	-	-	-	-	1	1
CO3	3	2	3	3	3	3	-	-	-	-	-	-	1	2
CO4	3	2	3	1	2	-	2	-	-	-	-	-	1	1
CO5	3	2	-	1	2	-	-	-	-	-	-	-	2	1
Avg	3	2	3	2	2.6	-	2	-	-	-	-	-	1.2	1.2

16CY1101-Engineering Chemistry

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	2	1	1	-	-	-	-	1	1	1
CO2	3	2	2	-	2	1	-	-	-	-	-	1	1	-
CO3	3	2	2	-	2	1	1	-	-	-	-	1	1	-
CO4	3	2	2	2	2	1	-	-	-	-	-	1	1	1
CO5	3	2	2	-	2	1	-	-	-	-	-	1	1	1
Avg	3	2	2	2	2	1	-	-	-	-	-	1	1	1

16HE1101R -Essential English for Engineers –I

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	-	-	-	-	1	1	-	-	3	-	1	-	-
CO2	1	1	-	2	-	2	1	-	2	3	-	2	-	1
CO3	1	-	1	-	-	3	-	-	2	3	-	1	-	1
CO4	1	1	1	1	-	1	1	-	2	3	-	2	-	-
CO5	1	-	1	1	-	2	1	-	-	3	-	2	1	1
Avg	1	1	1	1.3	-	1.8	1	-	2	3	-	1.6	1	1

16GE1101-Computer Programming

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	2	1	1	-	-	-	-	2	2	3
CO2	3	2	2	-	2	1	-	-	-	-	-	2	2	3
CO3	3	2	2	-	2	1	1	-	-	-	-	2	3	3
CO4	3	2	2	2	2	1	-	-	-	-	-	2	3	3
CO5	3	2	2	-	2	1	-	-	-	-	-	2	3	3
Avg	3	2	2	0.4	2	1	0.2	-	-	-	-	2	3	3

16ME1201-Basics of Civil and Mechanical Engineering

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	1	-	-	1	-	-	-	-	-	1	3	3
CO2	3	1	1	-	-	1	-	-	-	-	-	1	3	2
CO3	3	1	1	-	-	1	-	-	-	-	-	1	2	2
CO4	3	1	1	-	-	1	-	-	-	-	-	1	3	2
CO5	3	1	1	-	-	1	-	-	-	-	-	1	3	2
Avg	3	1	1	-	-	1	-	-	-	-	-	1	3	2

16GE1001 -Computer Programming Lab

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	2	1	2	-	-	-	-	2	2	3
CO2	3	2	2	-	2	1	2	-	-	-	-	2	2	3
CO3	3	2	2	1	2	1	2	-	-	-	-	2	2	3
CO4	3	2	2	2	2	1	2	-	-	1	-	2	2	3
CO5	3	2	2	-	2	1	1	-	-	-	-	2	2	3
Avg	3	2	2	0.6	2	1	2.4	-	-	0.2	-	2	2	3

16GE1002-Engineering Practices Laboratory

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	3	-	3	-	1	-	1	-	-	-	1	2
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-		-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Avg	3	-	3	-	3	-	-	-	1	-	-	-	1	2

SEMESTER II

16MA2102 -Engineering Mathematics-II

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	2	-	-	-	-	-	-	2	1	2
CO2	3	3	3	2	2	-	-	-	-	-	-	2	1	2
CO3	3	3	3	2	2	-	-	-	-	-	-	2	1	2
CO4	3	3	3	2	2	-	-	-	-	-	-	2	1	2
CO5	3	3	3	2	2	-	-	-	-	-	-	2	1	2
Avg	3	3	3	2	2	-	-	-	-	-	-	2	1	2

16PH2102-Physics of Materials

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	1	1	1	-	-	-	-	-	-	1	1
CO2	3	3	1	1	2	-	-	-	-	-	-	-	2	1
CO3	3	2	1	2	2	-	-	-	-	-	-	-	3	2
CO4	3	3	1	2	2	1	-	-	-	-	-	-	1	1
CO5	3	2	2	3	2	1	2	-	-	-	-	-	2	2
Avg	3	2.4	1.2	1.8	1.8	0.6	0.4	-	-	-	-	-	1.8	1.4

16CY2102-Environmental Science

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	-	-	_	_	2	3	3	2	_	2	2	2	1
CO2	2	1	1	_	_	2	3	3	2	_	2	2	2	1
CO3	2	-	-	_	_	2	3	3	2	_	2	2	2	1
CO4	2	1	2	_	_	2	3	3	2	_	2	2	2	2
CO5	2	1	2	_	_	2	3	3	2	_	2	2	2	2
Avg	2	0.6	0.8	_	_	2	3	3	2	_	2	2	2	1.2

16HE2102R -Essential English for Engineers – II

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	1	3	-	-	1	-
CO2	2	2	-	-	-	2	-	-	3	3	-	2	-	1
CO3	2	-	2	-	-	-	-	-	2	3	-	-	1	-
CO4	-	1	-	1	-	-	-	-	1	2	-	2	1	1
CO5	2	1	2	-	1	-	-	-	1	3	-	-	2	1
Avg	2	1.3	2	1	1	2	-	-	1.6	2.8	-	2	1.2	1

16GE2102-Engineering Graphics

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	2	-	1	-	1	-	-	1	1	1	1	2
CO2	3	3	2	1	1	-	1	-	-	1	1	1	1	2
CO3	3	3	3	-	1	1	1	-	-	1	1	-	1	1
CO4	3	3	3	1	1	2	1	-	-	1	1	1	1	1
CO5	3	3	3	1	1	3	1	-	-	1	1	1	1	1
Avg	2.8	3	2.6	1	1	2	1	-	-	1	1	1	1	1.4

16EI2201 - Electrical Circuit Theory

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	-	2	-	-	-	1	-	-	-	3	3
CO2	3	3	-	-	2	-	-	-	-	-	2	-	3	3
CO3	3	2	-	2	1	-	-	-	-	-	2	-	3	3
CO4	3	2	1	2	-	-	1	2	-	-	2	-	2	2
CO5	2	2	1	-	-	-	1	-	-	-	-	-	3	3
Avg	3	2.8	0.6	0.8	1	-	0.4	0.4	0.2	-	1.2	-	2.8	3

16EI2001-Electrical Circuit Laboratory

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	-	2	-	-	-	1	-	-	-	3	3
CO2	3	3	-	-	2	-	-	-	-	-	2	-	3	3
CO3	3	2	-	2	1	-	-	-	-	-	2	-	3	3
CO4	3	2	1	2	-	-	1	2	-	-	2	-	2	2
CO5	2	2	1	-	-	-	1	-	-	-	-	-	3	3
Avg	3	2.8	0.6	0.8	1	-	0.4	0.4	0.2	-	1.2	-	2.8	3

SEMESTER III

16MA3103-Fourier Analysis and Statistics

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	3	1	2	-	-	-	-	-	-	2	3	1
CO2	3	3	3	2	1	-	-	-	-	-	-	3	2	3
CO3	3	3	3	1	1	-	-	-	-	-	-	2	2	2
CO4	3	3	3	1	2	2	-	-	-	-	-	2	2	2
CO5	3	3	3	2	1	1	-	-	-	-	-	2	2	3
Avg	3	2	3	1	2	-	-	-	-	-	-	2	3	1

16EI3201- Electronic Instrumentation

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	-	-	-	-	-	-	-	-	-	3	3
CO2	3	2	2	-	-	2	-	-	2	-	-	-	3	3
CO3	3	2	-	-	-	-	2	-	-	-	-	1	3	3
CO4	3	2	2	3	-	-	1	-	-	-	-	2	3	3
CO5	3	3	3	3	-	-	1	-	-	1	-	2	3	3
Avg	3	2.2	1.6	1.2	-	0.2	1.4	-	0.4	0.2	-	1.2	3	3

16EI3202 - Electronic Devices and Circuits

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	-	-	2	1	-	2	-	-	-	3	2
CO3	3	2	-	-	-	-	2	-	-	-	-	-	2	3
CO4	3	2	2	3	-	-	1	-	-	-	-	2	3	3
CO5	1	3	3	3	-	-	1	-	-	1	-	2	3	3
Avg	2.6	2.8	1.6	1.2	-	0.2	1.4	-	0.4	0.2	-	0.8	2.8	3

16EI3203 - Measurements and Instrumentation

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	-	1	-	1	-	-	-	-	1	3	3
CO2	3	3	2	-	-	2	1	-	-	-	-	1	3	3
CO3	3	3	2	2	-	-	1	-	-	-	-	1	3	3
CO4	3	3	2	-	-	-	1	-	-	1	1	2	3	3
CO5	3	3	3	3	1	-	1	1	-	1	-	2	3	3
Avg	3	3	2.2	1	0.4	0.4	1	0.2	-	0.4	0.2	1.4	3	3

16EI3204 - Transducer Engineering

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	1	-	1	-	-	-	-	1	3	3
CO2	3	2	2	-	-	2	1	-	-	-	-	1	3	3
CO3	3	3	2	2	-	-	1	-	-	-	-	1	2	3
CO4	3	3	2	-	-	-	1	-	-	1	-	2	3	3
CO5	3	3	3	3	1	-	1	-	-	1	-	2	3	3
Avg	3	2.8	2.2	1	0.4	0.4	1	-	-	0.4	-	1.4	2.8	3

16ME3231 - Fundamentals of Thermodynamics and Fluid Dynamics

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	1	1	1	-	-	-	-	-	1	2	3
CO2	2	3	3	1	1	-	-	-	-	-	-	1	2	3
CO3	3	3	2	2	1	1	-	-	-	-	-	1	2	3
CO4	2	3	1	1	2	2	1	-	1	-	2	1	3	2
CO5	3	3	1	1	1	3	-	-	1	-	-	1	3	3
Avg	2.6	3	1.8	1.2	1.2	1.4	0.2	-	0.4	-	0.4	1	2.2	2.8

16EI3001 - Transducer and Measurements Laboratory

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	3	-	-	-	-	-	3	-	-	-	3	3
CO2	2	3	3	3	-	-	-	-	3	-	-	-	3	3
CO3	2	3	3	-	-	-	-	-	3	-	-	-	3	3
CO4	2	1	3	2	-	-	1	-	3	-	-	-	3	2
CO5	2	-	3	-	3	-	1	-	3	-	-	3	3	2
Avg	2	1.6	3	0.4	0.5	-	0.4	-	3	-	-	0.5	3	2.6

16EI3002 - Electronic Devices and Circuits Laboratory

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	-	-	-	-	-	-	3	-	-	-	-	3
CO2	2	1	2	-	-	1	-	-	3	-	2	-	2	3
CO3	3	1	3	-	-	2	-	-	3	-	1	-	2	2
CO4	3	1	1	-	-	3	-	-	3	-	-	-	1	2
CO5	3	-	-	-	-	-	-	-	3	-	-	-	3	3
Avg	2.8	1.2	1	-	-	1	-	-	3	-	0.5	-	1.6	2.2

SEMESTER IV

16MA4107 – Numerical Methods

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	-	-	-	-	-	-	2	2	2
CO2	3	3	3	3	3	-	-	-	-	-	-	2	2	1
CO3	3	3	3	3	2	-	-	-	-	-	-	2	2	1
CO4	3	3	3	3	3	-	-	-	-	-	-	2	2	1
CO5	3	3	3	3	3	-	-	-	-	-	-	2	2	1
Avg	3	3	3	3	2.6	-	-	-	-	-	-	2	2	1.2

16EI4201 - Electrical Machines

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	2	1	1	1	1	-	-	-	-	1	3	3
CO2	3	3	3	3	1	-	-	-	-	-	-	1	3	3
CO3	3	3	3	2	1	-	1	-	1	-	-	1	1	3
CO4	3	3	3	3	1	1	1	-	1	-	-	2	1	3
CO5	3	3	2	2	1	-	-	-		-	1	2	3	3
Avg	2.8	3	2.6	2.2	1	0.4	0.6	-	0.4	-	0.2	1.4	2.2	3

16EI4202 - Linear Integrated Circuits and Applications

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	3
CO2	3	1	2	-	-	2	-	-	-	-	-	-	3	3
CO3	3	1	2	2	-	-	-	-	-	-	-	-	1	3
CO4	3	1	2	-	-	-	2	-	-	-	-	2	1	3
CO5	3	3	3	3	-	-	-	-	-	-	-	2	-	3
Avg	3	2.2	2.2	2.5	-	2	0.4	-	-	-	-	2	2.2	3

16EI4203 - Digital Logic Circuits

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	1	-	1	-	-	-	-	1	3	2
CO2	3	-	2	-	-	2	1	-	-	-	-	-	3	2
CO3	-	1	2	2	-	-	1	-	-	-	-	-	1	3
CO4	3	-	2	-	-	-	1	-	-	1	-	2	1	3
CO5	1	3	3	3	1	-	1	-	-	-	-	2	1	3
Avg	2	1.2	2.2	0.5	0.4	0.4	1	-	-	0.2	-	0.5	1.8	2.6

16EI4204-Power Plant Instrumentation

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	-	1		1	-	1	1	1	1	-	-	2	2
CO2	-	2	2	2	1	2	1	-	-	-	-	-	2	2
CO3	2	2	2	-	1	1	1	-	1	-	-	-	2	2
CO4	2	2	2	-	1	1	1	-	-	-	1	1	2	2
CO5	-	1	2	1	1	1	1	-	-	-	1	-	2	2
Avg.	1.2	1.4	1.8	0.6	1	1	1	0.2	0.4	0.2	0.4	0.2	2	2

16EI4205- Industrial Instrumentation-I

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	2
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
CO4	3	-	-	-	-	-	-	1	2	-	-	2	-	3
CO5	1	3	3	3	-	-	-	-	-	-	-	2	-	3
Avg	2	1.2	2.2	1	-	0.4	-	0.2	0.4	-	-	0.8	1.2	2.6

16EI4001 - Electrical Machines Laboratory

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	3	-	-	2	-	3
CO2	3	2	-	2	-	-	-	-	3	-	-	2	-	3
CO3	3	2	-	2	-	-	-	-	3	-	-	-	-	3
CO4	3	1	-	-	-	-	1	-	3	-	-	-	1	3
CO5	3	-	-	-	-	-	-	-	3	-	-	2	3	3
Avg	3	1.2	-	0.8	-	-	0.2	-	3	-	-	1.2	1.2	3

16EI4002 - Linear and Digital Integrated Circuits Laboratory

PO& PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	-	-	-	-	-	-	3	-	-	2	-	3
CO2	2	-	2	-	-	-	-		3	-	-	2	-	3
CO3	3	-	3	2	-	-	-	-	3	-	-	-	-	3
CO4	3	-	-	-	2	-	-	-	3	-	-	-	-	2
CO5	3	-	-	2	-	-	-	-	3	-	-	2	3	3
Avg	2.8	0.4	2.5	0.8	0.4	-	-	-	3	-	-	1	0.6	2.8

Chairman Board of Studies

Dean - Academics

REGULATIONS 2016

B.E ELECTRONICS AND INSTRUMENTATION ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of the programme B E Electronics and Instrumentation Engineering will

PEO 1. Graduates would have strong foundation in basic science and mathematics to formulate, analyze and solve electronics and instrumentation problems.

PEO 2. Graduates shall have good knowledge of instrumentation systems and their applications to design control and safety systems for industrial process.

PEO 3. Graduates exhibit professionalism with ethics, communication and team work to satisfy the needs of the society.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO 1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1. Ability to apply concepts of measurement and sensor to design, calibrate and control various process instruments using industrial automation.

PSO 2. Ability to analyze advanced electronics and instrumentation concepts required for industrial and research pursuits.

MAPPING OF CO'S, PO'S & PSO'S

COs	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
I	3	3	3	3	3	3	3	3	3	3	3	3	3	3
II	3	3	3	3	3	3	3	3	3	3	3	3	3	3
III	3	3	3	3	3	3	3	3	3	3	3	3	3	3
IV	3	3	3	3	3	3	3	3	3	3	3	3	3	3
V	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Hindusthan College of Engineering And Technology
Approved by AICTE, New Delhi, Accredited with 'A' Grade by NAAC
(An Autonomous Institution, Affiliated to Anna University, Chennai)
Coimbatore - 641032

DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING

REGULATIONS 2016

Mapping of Course Outcome and Programme Outcome:

Year	Sem	Course code & Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
I	I	16MA1101-Engineering Mathematics-I	3	3	3	2	2	-	-	-	-	-	-	2	2	2
		16PH1101-Engineering Physics	3	2	3	2	2.6	-	2	-	-	-	-	-	1.2	1.2
		16CY1101-Engineering Chemistry	3	2	2	2	2	1	-	-	-	-	-	1	1	1
		16HE1101R -Essential English for Engineers – I	1	1	1	1.3	-	1.8	1	-	2	3	-	1.6	1	1
		16GE1101-Computer Programming	3	2	2	0.4	2	1	0.2	-	-	-	-	2	3	3
		16ME1201-Basics of Civil and Mechanical Engineering	3	1	1	-	-	1	-	-	-	-	-	1	3	2
		16GE1001 -Computer Programming Lab	3	2	2	0.6	2	1	2.4	-	-	0.2	-	2	2	3
		16GE1002-Engineering Practices Laboratory	3	-	3	-	3	-	-	-	1	-	-	-	1	2
		16GE1003 - Language														

		Competency Enhancement Course-I														
	II	16MA2102 - Engineering Mathematics-II	3	3	3	2	2	-	-	-	-	-	-	2	1	2
		16PH2102-Physics of Materials	3	2.4	1.2	1.8	1.8	0.6	0.4	-	-	-	-	-	1.8	1.4
		16CY2102-Environmental Science	2	0.6	0.8	-	-	2	3	3	2	-	2	2	2	1.2
		16HE2102R -Essential English for Engineers – II	2	1.3	2	1	1	2	-	-	1.6	2.8	-	2	1.2	1
		16GE2102-Engineering Graphics	2.8	3	2.6	1	1	2	1	-	-	1	1	1	1	1.4
		16EI2201 - Electrical Circuit Theory	3	2.8	0.6	0.8	1	-	0.4	0.4	0.2	-	1.2	-	2.8	3
		16EI2001-Electrical Circuit Laboratory	3	2.8	0.6	0.8	1	-	0.4	0.4	0.2	-	1.2	-	2.8	3
		19HE2071 - Language Competency Enhancement Course-II														
II	III	16MA3103-Fourier Analysis and Statistics	3	2	3	1	2	-	-	-	-	-	-	2	3	1
		16EI3201- Electronic Instrumentation	3	2.2	1.6	1.2	-	0.2	1.4	-	0.4	0.2	-	1.2	3	3
		16EI3202 - Electronic Devices and Circuits	2.6	2.8	1.6	1.2	-	0.2	1.4	-	0.4	0.2	-	0.8	2.8	3
		16EI3203 - Measurements and Instrumentation	3	3	2.2	1	0.4	0.4	1	0.2	-	0.4	0.2	1.4	3	3
		16EI3204 - Transducer Engineering	3	2.8	2.2	1	0.4	0.4	1	-	-	0.4	-	1.4	2.8	3
		16ME3231 - Fundamentals of Thermodynamics and	2.6	3	1.8	1.2	1.2	1.4	0.2	-	0.4	-	0.4	1	2.2	2.8

		Fluid Dynamics														
		16EI3001 - Transducer and Measurements Laboratory	2	1.6	3	0.4	0.5	-	0.4	-	3	-	-	0.5	3	2.6
		16EI3002 - Electronic Devices and Circuits Laboratory	2.8	1.2	1	-	-	1	-	-	3	-	0.5	-	1.6	2.2
	IV	16MA4107 – Numerical Methods	3	3	3	3	2.6	-	-	-	-	-	-	2	2	1.2
		16EI4201 - Electrical Machines	2.8	3	2.6	2.2	1	0.4	0.6		0.4		0.2	1.4	2.2	3
		16EI4202 - Linear Integrated Circuits and Applications	3	2.2	2.2	2.5	-	2	0.4	-	-	-	-	2	2.2	3
		16EI4203 - Digital Logic Circuits	2	1.2	2.2	0.5	0.4	0.4	1	-	-	0.2	-	0.5	1.8	2.6
		16EI4204-Power Plant Instrumentation	1.2	1.4	1.8	0.6	1	1	1	0.2	0.4	0.2	0.4	0.2	2	2
		16EI4205- Industrial Instrumentation-I	2	1.2	2.2	1	-	0.4	-	0.2	0.4	-	-	0.8	1.2	2.6
		16EI4001 - Electrical Machines Laboratory	3	1.2	-	0.8	-	-	0.2	-	3	-	-	1.2	1.2	3
		16EI4002 - Linear and Digital Integrated Circuits Laboratory	2.8	0.4	2.5	0.8	0.4	-	-	-	3	-	-	1	0.6	2.8
III	**V**	16EI5201 -Industrial Instrumentation – II	3	2.2	2	2	1	-	0.4	-	-	0.4	-	0.6	2.6	3
		16EI5202 - Analytical Instrumentation	2	1.2	2.2	1	-	0.4	1.2	-	-	0.2	-	0.8	2.6	3
		16EI5203 - Microprocessors and Microcontrollers	2.6	1.2	2.2	1	0.4	0.4	1	-	0.2	-	-	1.4	2	2.6
		16EI5204 – Control Systems	3	2.4	2.2	1	0.4	0.4	0.2	-	-	0.2	-	1.2	2.8	3
		16IT5231 - Object Oriented Programming	2.2	1.2	2.2	1	-	0.4	-	-	0.4	-	-	0.6	2	2.6

		Using Java														
		16EI53XX - Professional Elective – I														
		16EI5001- Microprocessors and Microcontrollers Laboratory	2	1.6	3	1	0.6	-	3	-	2.3	-	-	1	2.6	2.8
		16EI5002 - Industrial Instrumentation Laboratory	2.8	1.2	0.6	0.8	0.4	-	3	-	3	-	0.2	1.8	1.2	2.8
		16IT5031- Object Oriented Programming Laboratory	2.2	2	3	1	1	-	3	-	2.3	-	-	1	2.6	3
	VI	16EI6201 – Process Control	3	2.2	2.2	1	0.4	0.8	0.4	-	0.2	0.6	-	0.8	2.2	3
		16EI6202-Applied VLSI Design	3	2	3	2.8	2	-	-	0.6	-	0.2	0.6	-	3	3
		16EI6203- Discrete Time and Signal Processing	3	2	2	2	1	-	-	0.2	-	0.4	-	-	2	2.6
		16EI6204 -Embedded System	2.8	2.2	2.2	1	-	0.4	-	0.2	0.4	0.2	-	0.8	2.2	3
		16EI63XX - Professional Elective – II														
		16XX64XX -Open Elective - I														
		19EI6001 – Process Control laboratory	3	2.2	3	1.4	1.8	-	3	-	3	-	-	2	2.8	3
		16EI6002 - Virtual Instrumentation Laboratory	2.8	0.6	1	0.8	0.4	-	2	-	3	-	0.2	1.2	1.2	2.8
		16EI6701-Technical Seminar	2.8	1.2	1	0.8	0.6	-	2	-	3	-	0.4	1.2	2	2.6

IV	VII	16EI7201-Computer Control of Process	2.6	1.2	2.2	1	0.4	0.8	0.4	-	0.4	-	-	0.8	2.2	2.6
		16EI7202-Industrial Data Networks	2.2	1.8	2.2	-	1.4	-	0.8	-	0.4	-	0.2	-	2	2.4
		16EI7203-Programmable Logic and Distributed Control System	2.8	2.2	2	0.4	0.6	-	0.2	-	0.4	-	-	1.4	2	2.8
		16EI73XX - Professional Elective - III														
		16EI73XX - Professional Elective - IV														
		16XX74XX -Open Elective - II														
		16EI7001-Computer Control of Process and Simulation Laboratory	2.8	1.2	1	0.8	0.6	-	0.4	-	3	-	-	1.2	1.2	2.8
		16EI7002-Instrumentation System Design Laboratory	2.8	1.2	1	0.8	0.4	-	0.4	-	2.6	-	-	1.2	1	2.8
		16EI7701-Internship / Industrial Training	3	2.8	0.6	1	0.6	1	1	0.6	1.6	-	0.2	0.8	2.8	2.2
	VIII	16EI83XX - Professional Elective - V														
		16EI83XX - Professional Elective - VI														
		16EI8901-Project Work	2.6	2	1	1.2	-	1	-	0.6	1.4	0.6	0.8	1	2.6	2.8

PROFESSIONAL ELECTIVE COURSES

Elective	Sem	Course code & Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
I	V	16EI5301-Thermal Power Plant Instrumentation	3	2.6	1.8	0.6	1	1	1.2	0.2	0.4	0.2	0.4	0.2	2.6	3
		16EI5302-Digital System Design	3	2.6	1.2	0.6	0.6	0.4	1.2	1	-	0.2	0.4	2	3	3
		16EI5303-Digital Image Processing	3	2.6	2.8	2.8	2	-	1.2	-	0.2	0.4	-	2.8	3	3
		16EI5304-Communication Engineering	3	3	2.4	2.4	0.8	0.8	1.4	3	1	1.8	0.4	0.6	2.2	3
II	VI	16EI6301-Industrial Electronics	3	2.6	2.2	-	1.4	-	1.2	-	0.4	-	0.2	-	2.2	2.8
		16EI6302-Biomedical Instrumentation	3	2.6	2	0.4	0.6	-	1.2	-	-	-	-	1.4	2.2	3
		16EI6303-Advanced Control Theory	2.8	3	2.2	2.8	2.8	-	0.2	0.4	2.2	1.8	2.6	2	3	2.8
		16EI6304-Instrumentation in Petrochemical Industries	2.8	2	1.8	1	-	0.6	-	0.2	0.4	-	0.8	2	3	3
III	VII	16EI7301-Fiber Optics and Laser Instrumentation	3	2.4	2	1	-	-	0.2	0.4	-	0.4	-	0.6	2	3
		16EI7302-Adaptive Control and System Identification	3	2.1	2	1	-	-	0.4	0.4	-	0.6	-	0.6	3	3
		16EI7303-Instrumentation in Cement and Steel	2.8	2.2	1.8	1	-	0.6	0.2	0.8	0.4	-	1.2	2	2.6	3

		Industries														
		16EI7304-Telemetry and Telecontrol	3	3	2	1	-	-	0.4	0.6	-	0.4	-	0.6	2.6	3
IV		16EI7305-Instrumentation in Paper Industries	3	2.6	2.6	1.8	1	2.6	1.4	1.4	1.4	-	-	2.2	3	3
		16EI7306-Micro Electro Mechanical Systems	3	2.6	2	2	3	-	0.2	-	-	3	-	2.6	3	3
		16EI7307-Non-Linear Control System	3	3	2.2	2.8	2.8	-	0.2	0.4	2.2	1.8	2.6	2	3	3
		16EI7308-Sensor Technology	3	3	2	2	3	-	0.4	-	-	3	0.2	2.6	2.8	3
V	**VIII**	16EI8301-Instrumentation System Design	3	3	1.2	0.6	0.6	0.4	1.2	1	-	0.4	0.4	2	2.8	3
		16EI8302-Microcontroller Based System Design	3	3	1.4	0.6	0.6	0.4	1.2	0.4	-	0.4	0.4	2.2	2.8	3
		16EI8303-Robotics and Automation	3	3	0.8	3	-	-	1.2	1	0.2	-	1.8	2.6	2.6	3
		16EI8304-Nuclear Power Plant Instrumentation	3	1.4	2.6	1.8	1	2.6	1.4	1.4	1.4	-	-	1.2	3	3
VI		16EI8305-Environmental Instrumentation	2.8	3	0.8	3	-	-	1.2	1	0.2	-	1.8	2.2	2.6	3
		16EI8306-Safety Instrumentation System	3	3	0.8	3	-	-	0.4		0.2	-	2	2.6	3	3
		16EI8307-Instrumentation Systems for Disaster Management	3	2.6	0.4	1.2	0.6	-	0.4	1	1.2	-	0.6	2	3	2.6
		16EI8308-Professional Ethics in Engineering	3	2.6	0.6	-	-	2.4	2.2	3	1.8	2.4	-	2.2	3	3

OPEN ELECTIVE COURSES

Elective	Sem	Course code & Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
I	VI	16EI6401-Neural Networks and Fuzzy Systems	3	3	2.2	3	-	-	0.6		0.4	-	2.2	2	3	3
II	VII	16EI7402- Electrical Energy Management and Audit	3	2.6	1.4	1	-	0.4	0.4	0.6	0.4	-	2	1.2	3	3

1-Low, 2-Medium, 3-High, - No Correlation

Chairman Board of Studies

Dean - Academics