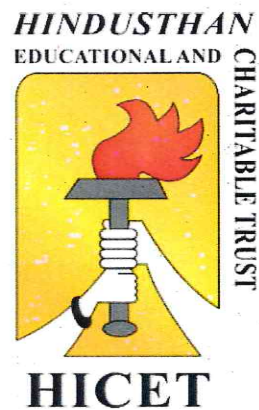


# ***HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY***

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

## **B.E. ELECTRICAL AND ELECTRONICS ENGINEERING**



### **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.

  
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## VISION AND MISSION OF THE DEPARTMENT

### VISION

To manifest itself as a valuable global resource for industry and society with strong foundation. Abetting the students with innovative ethical and creative talents of endeavoring young professionals in Electrical and Electronics Engineering.

### MISSION

- M1. Educate the students to acquire knowledge in recent advancement of Electrical and Electronics Engineering and prepare the students for Professional career and higher studies.
- M2. Inculcate the students to develop innovation for the societal needs through research oriented teaching and creative skill enhancement training.
- M3. Enunciate the students with better skills to meet the challenges of the technical world and intensify the skills towards the practical approach

  
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## 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.

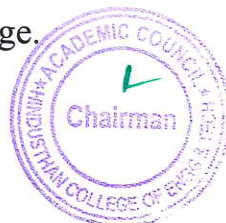
  
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- PO 6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO 7. **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.

  
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## **PROGRAM SPECIFIC OUTCOMES (PSOs)**

- PSO 1. Graduates will acquire the knowledge of design, performance & testing of static & dynamic Electrical Machines, Electrical Drives, Power Electronics applicable in core and related fields.
- PSO 2. Graduates will attain knowledge and acquire skills by applying modern software tools for design, simulation and analysis of Electrical Systems to successfully adapt in multi-disciplinary environments.

## **PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

- PEO 1. Graduate will be able to execute the principles of basic science, mathematics and engineering fundamentals necessary to formulate, solve and analyze engineering problems.
- PEO 2. Graduate will be able to accrete the knowledge for pursuing advanced degrees in Engineering, Science, Management, Research and Development.
- PEO 3. Graduate will be able to effectuate professionalism, leadership qualities, self and continuous learning and concern for environment to meet the societal needs.

  
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# **CURRICULUM**



# 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.



## DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS

### CBCS PATTERN

### UNDERGRADUATE PROGRAMMES

### B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

### 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
<b>THEORY</b>									
1	16MA1101	Engineering Mathematics-I	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
<b>PRACTICAL</b>									
7	16PS1001	Physical Sciences Laboratory -I	0	0	2	1	50	50	100
8	16GE1001	Computer Programming Lab	0	0	4	2	50	50	100
9	16GE1002	Engineering Practices Laboratory	0	0	4	2	50	50	100
10	16GE1003	Value Added Course I : Language Competency Enhancement Course-I	0	0	2	1	0	100	100
<b>Total Credits:</b>			<b>18</b>	<b>3</b>	<b>12</b>	<b>27</b>	<b>300</b>	<b>700</b>	<b>1000</b>



**SEMESTER II**

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>									
1	16MA2102	Engineering Mathematics-II	3	1	0	4	25	75	100
2	16PH2102	Physics of Materials	3	0	0	3	25	75	100
3	16CY2102	Environmental Sciences	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	16EE2201	Electrical Circuit Theory	3	0	0	3	25	75	100
<b>PRACTICAL</b>									
7	16PS2001	Physical Sciences Laboratory - II	0	0	2	1	50	50	100
8	16EE2001	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
<b>Total Credits:</b>			<b>17</b>	<b>2</b>	<b>12</b>	<b>25</b>	<b>250</b>	<b>650</b>	<b>900</b>

**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
<b>THEORY</b>									
1	16MA3103	Fourier Analysis and Statistics	3	1	0	4	25	75	100
2	16EE3201	Transformers and DC Machines	3	0	0	3	25	75	100
3	16EE3202	Electronic Devices and Circuits	3	0	0	3	25	75	100
4	16EE3203	Measurements and Instrumentation	3	0	0	3	25	75	100
5	16EE3204	Electromagnetic Theory	3	0	0	3	25	75	100
6	16EE3205	Power Plant Engineering	3	0	0	3	25	75	100
<b>PRACTICAL</b>									
7	16EE3001	Transformers and DC Machines Laboratory	0	0	4	2	50	50	100
8	16EE3002	Electronic Devices and Circuits Laboratory	0	0	4	2	50	50	100
<b>Total Credits:</b>			<b>18</b>	<b>1</b>	<b>8</b>	<b>23</b>	<b>250</b>	<b>550</b>	<b>800</b>

**SEMESTER IV**

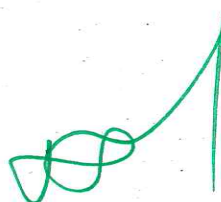
S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>									
1	16MA4107	Numerical Methods	3	1	0	4	25	75	100
2	16EE4201	Induction and Synchronous Machines	3	1	0	4	25	75	100
3	16EE4202	Linear Integrated Circuits and Applications	3	0	0	3	25	75	100
4	16EE4203	Digital Logic Circuits	3	0	0	3	25	75	100
5	16EE4204	Transmission and Distribution	3	0	0	3	25	75	100
6	16EE4205	Renewable Energy Sources	3	0	0	3	25	75	100
<b>PRACTICAL</b>									
7	16EE4001	Induction and Synchronous Machines Laboratory	0	0	4	2	50	50	100
8	16EE4002	Linear and Digital Integrated Circuits Laboratory	0	0	4	2	50	50	100
<b>Total Credits:</b>			<b>18</b>	<b>2</b>	<b>8</b>	<b>24</b>	<b>250</b>	<b>550</b>	<b>800</b>

**CREDIT**

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	27	25	23	24	25	25	22	16	187



Chairman, Board of Studies



Dean - Academics



Principal

**Dr. MAGUDESWARAN P.N**  
 Dean-Academics  
 Hindusthan College of  
 Engineering and Technology,  
 COIMBATORE-641 032.

**PRINCIPAL**  
 Hindusthan College Of Engineering & Technology  
 COIMBATORE - 641 032.

# **SYLLABUS**

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16MA1101	ENGINEERING MATHEMATICS – I (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
	<b>MATRICES</b> 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
I		
	<b>DIFFERENTIAL CALCULUS</b> Curvature in cartesian co-ordinates – Radius and Centre of curvature - Circle of curvature – Involute and Evolutes(parabola, ellipse, cycloid, asteroid) – Envelopes - single parameter and two parameter family of curves.	12
II		
	<b>ORDINARY DIFFERENTIAL EQUATIONS</b> Second and higher order linear differential equations with constant coefficients and with RHS of the form $e^{ax}$ , $x^n$ , $\sin ax$ or $\cos ax$ , $e^{ax}f(x)$ and $xf(x)$ where $f(x)$ is $\sin bx$ or $\cos bx$ – Method of variation of parameters – Linear differential equations with variable coefficients (Euler's equation)	12
III		
	<b>FUNCTIONS OF SEVERAL VARIABLES</b> 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
IV		
	<b>MULTIPLE INTEGRALS</b> 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
V		
<b>Total Instructional Hours</b>		<b>60</b>

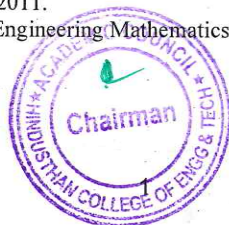
- Course Outcome
- CO1: Calculate Eigen values and Eigen vectors for a matrix which are used to determine the natural frequencies (or Eigen frequencies) of vibration and the shapes of these vibrational modes
- CO2: Apply the concept of differentiation to find the radius, centre and circle of curvature 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, "Engineering 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", 8<sup>th</sup> Edition, Laxmi Pub. Pvt. Ltd. 2011.
- R2 Grewal B.S, "Higher Engineering Mathematics", 42<sup>nd</sup> Edition, Khanna Publications, Delhi, 2012.
- R3 Peter V. O'Neil, "Advanced Engineering Mathematics", 7<sup>th</sup> Edition, Cengage learning, 2012.
- R4 Sivarama Krishna Das P and Rukmangadachari E., "Engineering Mathematics" Vol I, Second Edition, Pearson publishing, 2011.
- R5 Wylie & Barrett, "Advanced Engineering Mathematics", McGraw Hill Education, 6<sup>th</sup> edition, 2003



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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
	<b>PROPERTIES OF MATTER AND THERMAL PHYSICS</b> Elasticity – Hooke's law – Stress-strain diagram - Relation between three moduli 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
I		
	<b>LASER AND APPLICATIONS</b> 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
II		
	<b>FIBER OPTICS AND APPLICATIONS</b> 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
III		
	<b>ACOUSTICS AND ULTRASONICS</b> Classification of sound – Weber-Fechner law – Sabine's formula (no derivation) - Absorption coefficient and its determination –Factors affecting acoustics of buildings and their remedies. Production – Magnetostrictive generator – Piezoelectric generator – Determination of velocity using acoustic grating – Non destructive testing – Ultrasonic pulse echo system.	9
IV		
	<b>QUANTUM PHYSICS AND APPLICATIONS</b> 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
V		
<b>Total Instructional Hours</b>		<b>45</b>


- Course Outcome
- CO1: Enhance the fundamental knowledge in Properties of Matter and Thermal Physics.  
CO2: Understand 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, 8<sup>th</sup> 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

  
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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
	<b>WATER TECHNOLOGY</b>	
I	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
	<b>POLYMER &amp; COMPOSITES</b>	
II	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
	<b>ENERGY SOURCES AND STORAGE DEVICES</b>	
III	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 <sub>2</sub> -O <sub>2</sub> fuel cell applications.	9
	<b>ANALYTICAL TECHNIQUES</b>	
IV	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
	<b>NANOMATERIALS</b>	
V	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
<b>Total Instructional Hours</b>		<b>45</b>

**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.

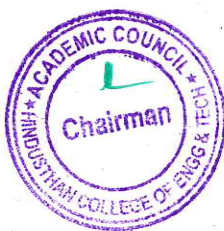
**TEXT BOOKS:**

- 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).

  
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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- <b>General Vocabulary.</b>	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- <b>Interpretation of a chart.</b>	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)- <b>Discussion on current affairs</b> - 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
<b>Total Instructional Hours</b>		<b>60</b>

- 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 – 2<sup>nd</sup> 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

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Programme	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16GE1101	COMPUTER PROGRAMMING (COMMON TO ALL BRANCHES)	3	0	0	3
Course Objective	1. Learn the fundamentals of computers. 2. Learn the basics of C programming 3. Learn the basics of Arrays and String 4. Learn the uses of functions and pointers. 5. Learn the basics of structures and unions.					

UNIT	DESCRIPTION	TOTAL INSTRUCTIONAL HOURS
I	<b>BASICS OF COMPUTER</b> Generation and Classification of Computers- Basic Organization of a Computer –Input and Output Devices–Hardware and Software definitions- Categories of Software- Number System Conversion and problems. Need for logical analysis and thinking – Algorithm -Pseudo code – Flow Chart.	9
II	<b>BASICS OF 'C' PROGRAMMING</b> Fundamentals of 'C' programming – Structure of a 'C' program – compilation and linking processes – Constants, Variables – Data Types –Expressions using operators in 'C' – Managing Input and Output operations- Decision making-Branching and Looping-Case study	9
III	<b>ARRAYS AND STRINGS</b> Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String Library functions – String Arrays. Matrix operations-Addition-Subtraction-Multiplication-Transpose-Case study.	9
IV	<b>FUNCTIONS AND POINTERS</b> Function – definition – Declaration – Types of Function definition – call by value-call by reference- Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays-Case study.	9
V	<b>STRUCTURES AND UNIONS</b> Structure- data type – definition – declaration –Nesting of structure - Union – Storage classes, Pre-processor directives-Case study.	9
	<b>TOTAL INSTRUCTIONAL HOURS</b>	<b>45</b>

Course Outcome	DESCRIPTION
CO1:	Use computers at user level, including operating systems, programming environments and differentiate between basic concepts of computer hardware and software.
CO2:	Analyze problems, design and implementing algorithmic solutions.
CO3:	Use data representation for the fundamental data types, read, understand and trace the execution of program written in C language.
CO4:	Write the C code using a modular approach and recursive concepts.
CO5:	Explain the use of pointers, Structures and union.

**TEXT BOOKS:**

- T1 – Balagurusamy “Programming in ANSI C”, Seventh Edition, McGraw-Hill, 2016.  
 T2 - Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.

**REFERENCE BOOKS:**

- R1 - Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011.  
 R2- M.Rajaram and P.Uma maheswari, “Computer Programming with C” Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2014.  
 R3 - Dr.N.Sengottaiyan and K.Ramya, “Fundamentals of Computer Programming”, Cengage Learning (India) Pvt. Ltd., 2016.

  
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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16ME1201	BASICS OF CIVIL AND MECHANICAL ENGINEERING	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	<b>SURVEYING AND CIVIL ENGINEERING MATERIALS</b> <b>Surveying:</b> Objects – types – classification – principles – measurements of distances <b>Civil Engineering Materials:</b> Bricks – stones – sand – cement – concrete – steel sections-Woods-Plastics.	12
II	<b>BUILDING COMPONENTS AND STRUCTURES</b> <b>Foundations:</b> Types, Bearing capacity – Requirement of good foundations. <b>Superstructure:</b> Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Types of Bridges and Dams.	12
III	<b>POWER PLANT ENGINEERING</b> 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	<b>IC ENGINES</b> 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	<b>REFRIGERATION AND AIR CONDITIONING SYSTEM</b> 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
<b>Total Instructional Hours</b>		<b>60</b>

- 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 Prahuraja V., Basic Mechanical EngineeringI, Anuradha Publishers, Kumbakonam, 2000.
- T2 Shanmugam G and Palanichamy M S, Basic Civil and Mechanical EngineeringI, 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.

  
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**HiCET**

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

Course Objective	Description
	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 aperture 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	Description
	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.



  
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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16PS1001	PHYSICAL SCIENCES LABORATORY – 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	Total Practical Hours
1.	Preparation of molar and normal solutions and their standardization.	30
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 <sub>2</sub> and Na <sub>2</sub> SO <sub>4</sub>	
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).	

- 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.

  
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PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16GE1001	COMPUTER PROGRAMMING LAB (COMMON TO ALL BRANCHES)	0	0	4	2

- Course Objective**
1. Be familiar with Microsoft office software.
  2. Be exposed to role of constants, variables, identifiers, operators and other building blocks of C Language.
  3. Be familiar with the use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
  4. Be familiar with the concept of Array and pointers dealing with memory management.
  5. Be exposed to Structures and unions.

S.NO	DESCRIPTION PF THE EXPERIMENTS	TOTAL PRACTICAL HOURS
1.	<b>a. Word Processing:</b> 1. Document creation, Text manipulation with Scientific notations 2. Table creation, Table formatting and conversion 3. Mail merge and Letter preparation 4. Flow Chart	3
2.	<b>b. Spread Sheet:</b> 1. Chart - Line, XY, Bar and Pie. 2. Formula - formula editor. 3. Spread sheet - inclusion of object, picture and graphics, protecting the document and sheet. 4. Sorting and Import / Export features.	6
3.	<b>c. Basic C programming:</b> C program using I/O Statements	3
4.	C program using arithmetic operations	3
5.	Decision making statement & Looping Concepts <ul style="list-style-type: none"> <li>• Designing a simple arithmetic calculator. (Use switch statement)</li> <li>• Performing the following operations: (Use loop statement)</li> <li>• Generate Pascal's triangle.</li> <li>• Construct a Pyramid of numbers.</li> </ul>	6
6.	<b>d. Arrays and Strings</b> C program using one dimensional arrays	3
7.	C program using two dimensional arrays	3
8.	C program using string functions	3
9.	<b>e. Functions and pointers</b> Perform the following operations: (Use recursive functions) <ol style="list-style-type: none"> <li>i. Find the factorial of a given integer.</li> <li>ii. Find the GCD (Greatest Common Divisor) of two given integers.</li> <li>iii. Solve Towers of Hanoi problem.</li> </ol>	6
10.	Program to swap two numbers using pointers - call by reference.	3
11.	<b>f. Structures and Unions</b> C Program using Structures	3
12.	C Program using Unions	3
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

**Course Outcome**

- CO1: Use office packages for documentation and presentation.  
CO2: Implement program using control structures.  
CO3: Handle arrays and strings.  
CO4: Handle functions and pointers.  
CO5: Form heterogeneous data using structure and union.

  
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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
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**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.
- Hands-on-exercise:
  - 4 ➤ 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**

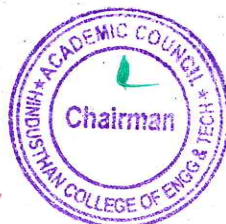
- Smithy operations: Upsetting, swaging, setting down and bending.
- Demonstration of – Production of hexagonal headed bolt.

**(E) Gas welding**

**(F) Foundry Tools and operations.**

**GROUP B (ELECTRICAL & ELECTRONICS)**

S.No	Description of the Experiments	
<b>ELECTRICAL ENGINEERING PRACTICES</b>		
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.	
<b>ELECTRONICS ENGINEERING PRACTICES</b>		
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.	
	<b>Total Practical Hours</b>	<b>45</b>
Course Outcome	CO1: Fabricate wooden components and pipe connections including plumbing works. CO2: Fabricate simple weld joints. CO3: Fabricate electrical and electronics circuits.	



  
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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

Course Objective	
	✓ To enhance student language competency
	✓ To identify individual students level of communication skills
	✓ To develop English Vocabulary and spoken communication skills.
	✓ To revive the fundamentals of English Grammar.

Unit	Description	Instructional Hours
I	<b>Listening</b> Language of Communication- English listening- Hearing Vs Listening- Verbal and Non-verbal communication – Listening strategies-Sounds of English.	3
	<b>Reading</b> English Language Enhancement – Indianism in English – Role of Reading in effective communication – Techniques for good reading (skimming and scanning) Reading articles from newspaper, magazine. Reading and interpreting a passage.	3
III	<b>Speaking</b> Common errors in Pronunciation – Signposts in English (Role play) – Public Speaking skills – Social Phobia – Eliminating fear – Common etiquette of speaking - Debate and Discuss.	3
IV	<b>Writing</b> Writing genre – Enhancement of basic English Vocabulary; Parts of Speech, Noun, Verbs, and Tenses – combining sentences, sentence formation and completion.	3
V	<b>Art of Communication</b> Communication process – Word building and roleplay – Exercise on English Language for various situations through online and offline activities.	3
<b>Total Instructional Hours</b>		<b>15</b>

Course Outcome	
	CO1- Trained to maintain coherence and communicate effectively.
	CO2- Practiced to create and interpret descriptive communication.
	CO3- Introduced to gain information of the professional world.
	CO4- acquired various types of communication and etiquette.
	CO5- Taught to improve interpersonal and intrapersonal skills.

#### REFERENCE BOOKS :

1. Verbal Ability and Reading Comprehension by Arun Sharma, 9<sup>th</sup> edition, Tata Mc graw Hill
2. Word Power Made Easy by Norman Lewis, – Print, 1 June 2011.
3. High School English Grammar by Wren and Martin, S.CHAND Publications, 1 January 2017.
4. Practical course in Spoken English by J.K. Gangal, PHI Learning , Second edition, 1 January 2018.

  
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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16MA2102	ENGINEERING MATHEMATICS – II (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	<b>VECTOR CALCULUS</b> 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 parallelepipeds.	12
II	<b>ANALYTIC FUNCTIONS</b> 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	<b>COMPLEX INTEGRATION</b> 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	<b>LAPLACE TRANSFORM</b> 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	<b>PARTIAL DIFFERENTIAL EQUATIONS</b> 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
<b>Total Instructional Hours</b>		<b>60</b>

- 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.

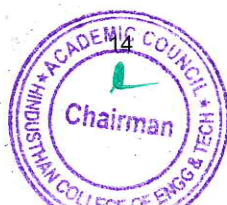
#### TEXT BOOKS:

- T1 Ravish R Singh, Mukul Bhatt, “Engineering 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”, 8<sup>th</sup> Edition, Laxmi Pub. Pvt. Ltd. 2011.
- R2 Grewal B.S, “Higher Engineering Mathematics”, 42<sup>nd</sup> Edition, Khanna Publications, Delhi, 2012.
- R3 Peter V. O’Neil, “Advanced Engineering Mathematics”, 7<sup>th</sup> Edition, Cengage learning, 2012.
- R4 Sivarama Krishna Das P and Rukmangadachari E., “Engineering Mathematics” Vol II, Second Edition, Pearson publishing, 2011.
- R5 Wylie & Barrett, “Advanced Engineering Mathematics”, McGraw Hill Education, 6<sup>th</sup> edition, 2003.

  
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<b>Programme</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
B.E.	16PH2102	PHYSICS OF MATERIALS	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	<b>CONDUCTING MATERIALS</b> 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
	<b>SEMICONDUCTING MATERIALS</b> 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	<b>MAGNETIC &amp; SUPERCONDUCTING MATERIALS</b> <b>Magnetic Materials:</b> 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.	9
	<b>Superconducting Materials :</b> 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	<b>DIELECTRIC &amp; COMPOSITES MATERIALS</b> Introduction – Electrical susceptibility – dielectric constant – polarization - electronic, ionic, orientation and space charge polarization – internal field – Clausius – Mosotti relation (derivation) – dielectric loss and dielectric breakdown (qualitative)	9
	Introduction to composites materials – types of composites materials – polymer, metallic and ceramic matrix composites (qualitative). Application in surgery, sports equipment.	9
V	<b>SMART MATERIALS AND NANOTECHNOLOGY</b> <b>New Engineering Materials:</b> Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications. <b>Nano Materials:</b> Synthesis - plasma arcing – Chemical vapour deposition – properties of nanoparticles and applications. – Carbon nano tubes – fabrication – pulsed laser deposition - Chemical vapour deposition - properties & applications.	9
<b>Total Instructional Hours</b>		<b>45</b>

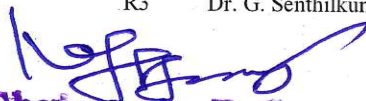
- Course Outcome
- CO1: Illustrate the electrical / thermal conductivity of conducting materials.  
CO2: Understand the purpose of the acceptor or donor levels and the band gap of a semiconductor.  
CO3: Interpret the basic idea behind the process of magnetism and applications of magnetic materials in 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 - I” VRB publishers Pvt Ltd., 2013

  
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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
	<b>ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY</b> 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	<b>ENVIRONMENTAL POLLUTION</b> 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	<b>NATURAL RESOURCES</b> 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: Worldfood problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energynneeds, 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	<b>SOCIAL ISSUES AND THE ENVIRONMENT</b> 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	<b>HUMAN POPULATION AND THE ENVIRONMENT</b> 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
<b>Total Instructional Hours</b>		<b>45</b>

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, 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.



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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 learners 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- <b>Reading comprehension.</b>	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- <b>interpretation of posters or advertisements.</b>	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) – <b>E-mail Writing - Note completion-</b> 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 <b>reply to a complaint.</b>	12
<b>Total Instructional Hours</b>		<b>60</b>

- 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 – 2<sup>nd</sup> Edition. 2014.  
T2 Ian Wood and Anne Williams. “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. Jordan, Cengage learning publishers.  
R3 Kamalesh Sadanan “A Foundation Course for the Speakers of Tamil-Part-I &II”, Orient Blackswan, 2010



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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	<b>PLANE CURVES</b> 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	<b>PROJECTIONS OF POINTS, LINES AND PLANE SURFACES</b> 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	<b>PROJECTIONS OF SOLIDS</b> 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	<b>SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES</b> 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	<b>ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS</b> 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
<b>Total Instructional Hours</b>		<b>75</b>

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", 5<sup>th</sup> 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.



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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EE2201	<b>ELECTRICAL CIRCUIT THEORY (COMMON TO EEE &amp; EIE BRANCHES)</b>	3	0	0	3

Course Objective	
	1. Analyze electric circuits and solve complex circuits
	2. Impart knowledge on various network theorems in AC and DC circuits
	3. Provide knowledge on resonance phenomenon and analyze coupled circuits
	4. Analyze transient response of AC and DC inputs to RL, RC and RLC circuits
	5. Draw phasor diagrams of voltage and current for three phase circuits and measure power and power factor.

Unit	Description	Instructional Hours
I	<b>BASIC CIRCUITS ANALYSIS</b> 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	<b>NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS</b> 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	<b>RESONANCE AND COUPLED CIRCUITS</b> 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	<b>TRANSIENT RESPONSE</b> 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	<b>THREE PHASE CIRCUITS</b> 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
<b>Total Instructional Hours</b>		<b>45</b>

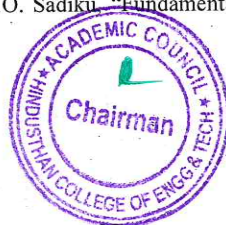
Course Outcome	
	CO1: Apply basic laws to electrical circuits.
	CO2: Solve electrical circuits using network theorems
	CO3: Explain the concept of resonance and solve coupled circuit problems
	CO4: Carryout problems in DC and AC transients
	CO5: Analyse and calculate three phase AC circuit parameters

#### TEXT BOOKS:

- T1 William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", Tata McGraw Hill publishers, 6<sup>th</sup> 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, New Delhi, 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).



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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

CO1: Experiment involving the physical phenomena of the Rigidity modulus of wire.  
CO2: Determine the band gap of a semiconductor and variation of Energy Gap ( $E_g$ ) with temperature.  
CO3: Assess the Young's modulus of a beam using non uniform bending method.  
CO4: Explain the concept of interference and calculate the thickness of thin wire and other fine objects.  
CO5: Experiment provides a unique opportunity to validate Dispersive power of a prism using Spectrometer.

  
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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.

  
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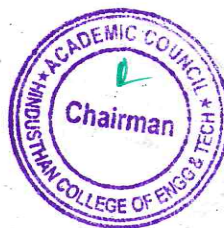
Programme	Course Code	Name of the Course	L	P	T	C
B.E.	16EE2001	ELECTRICAL CIRCUIT LABORATORY (COMMON TO EEE & EIE BRANCHES)	0	0	4	2

- Course Objective**
- To provide practical experience on verification of kirchoff's voltage law, kirchoff's current law and network theorems.
  - To design series and parallel resonant circuit and to analyse the simulation results.
  - To compare the time constant values of RL,RC circuits by conducting suitable experiments
  - To measure three phase power using two wattmeter method
  - 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	
<b>Total Instructional Hours</b>		<b>45</b>

- 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

  
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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

- Course Objective
- ✓ To improve communication skills and Professional Grooming.
  - ✓ To impart deeper knowledge of English Language and its practical application in different facets of life.
  - ✓ To equip the techniques of GD, Public Speaking, debate etc.

Unit	Description	Instructional Hours
	<b>Listening</b>	
I	Listening for gist and respond – Listen for detail using key words to extract specific meaning – listen for phonological detail – Listen and identify the main points for short explanations and presentation.	3
	<b>Reading</b>	
II	Strategies for effective reading – read and recognize different text types – Genre and Organization of Ideas – Quantifying reading – reading to comprehend – Interpreting sentences – contrasting, summarizing or approximating.	3
	<b>Speaking</b>	
III	Speak to communicate – Make requests and ask questions to obtain personal information – use stress and intonation – articulate the sounds of English to make the meaning understood – speaking to present & Interact – opening and closing of speech.	3
	<b>Writing</b>	
IV	Plan before writing – develop a paragraph: topic sentences, supporting sentences – write a descriptive paragraph – elements of good essay – descriptive, narrative, argumentative – writing emails – drafting resumes – project writing – convincing proposals.	3
	<b>Language Development</b>	
V	Demonstration at level understanding of application of grammar rules – revision of common errors : preposition, tenses, conditional sentences –reference words – pronouns and conjunctions.	3
<b>Total Instructional Hours</b>		<b>15</b>

- Course Outcome
- CO1- Introduced to different modes and types of communication.
  - CO2- Practiced to face and react to various professional situations efficiently.
  - CO3- learnt to practice managerial skills.
  - CO4- Familiarized with proper guidance to writing.
  - CO5- Trained to analyze and respond to different types of communication.

#### REFERENCE BOOKS:

1. Verbal Ability and Reading Comprehension by Arun Sharma, 9<sup>th</sup> edition, Tata Mc graw Hill
2. Word Power Made Easy by Norman Lewis, – Print, 1 June 2011.
3. High School English Grammar by Wren and Martin, S.CHAND Publications, 1 January 2017.
4. Practical course in Spoken English by J.K. Gangal, PHI Learning , Second edition, 1 January 2018.

  
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# **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
	<b>FOURIER SERIES</b>	
I	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 driven by an alternating square force. A series circuit with a square-wave voltage, power delivered by a periodic current and modelling radiation intensity.	12
	<b>BOUNDARY VALUE PROBLEMS</b>	
II	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
	<b>FOURIER TRANSFORMS</b>	
III	Fourier Transform Pairs - Fourier sine and cosine transforms – Properties - Transforms of Simple functions – Convolution Theorem – Parseval's identity.	12
	<b>TESTING OF HYPOTHESIS</b>	
IV	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
	<b>DESIGN OF EXPERIMENTS</b>	
V	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., Second reprint, 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, 6<sup>th</sup> 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 Engineers and Scientists", 8th Edition, Pearson Education, Asia, 2007.



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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EE3201	TRANSFORMERS AND DC MACHINES	3	0	0	3

- Course Objective
1. Recall the usage of magnetic materials in magnetic-circuits and their properties.
  2. Familiarize the constructional details, the principle of operation, prediction of performance, the methods of testing the transformers.
  3. Explains the working principles of electrical machines using the concepts of electromechanical energy conversion principles
  4. Practice the working principles of DC machines as Generator types, and their no-load / load characteristics.
  5. Estimate the various losses taking place in D.C. Motor and to study the different testing methods to arrive at their performance, starting methods and speed control of DC motors

Unit	Description	Instructional Hours
I	<b>MAGNETIC CIRCUITS AND MAGNETIC MATERIALS</b> Magnetic circuits - Flux linkage, Inductance and energy - Statically and Dynamically induced EMF - Torque – Properties of magnetic materials, Hysteresis and Eddy Current losses - AC excitation, introduction to permanent magnets-Transformer as a magnetically coupled circuit.	9
II	<b>TRANSFORMERS</b> Construction and Working - Parts of a Transformer - Emf equation - Transformation ratio - Ideal and Practical Transformer on No load and Load - Phasor diagrams - Impedance ratio and shifting parameters - Equivalent circuit parameters - Losses and Efficiency- Regulation - Tests: Open circuit and Short circuit –Sumpner’s test –All day Efficiency – Auto transformer: Construction and theory – Three phase transformer and connections – Applications.	9
III	<b>ELECTROMECHANICAL ENERGY CONVERSION</b> Electro Mechanical energy conversion - Force and Torque equations in magnetic system - Energy in magnetic field system - Field energy and Coenergy - Singly and multiply excited magnetic field systems.	9
IV	<b>D.C GENERATORS</b> Construction - Principle of operation - Types of D.C Armature windings - EMF equations - Types of D.C Generators - Losses in D.C Machine - Armature reaction and commutation - De magnetizing and Cross magnetizing conductors (AT/Pole) - compensating winding - Methods of improving commutation- Resistance and EMF - Characteristics of DC Generators - Applications.	9
V	<b>D.C MOTORS</b> Principle and Working of D.C Motors - Types of DC Motors - Back or Counter emf - Equations – Voltage , Power, Speed and Torque - Efficiency - D.C Motor characteristics - Speed control of DC motors: Flux, Armature and Voltage control methods - Electric Braking - Necessity of starters - three point and four point starter – Testing of D.C Machines - Swinburne’s test and Hopkinson’s test - DC Motor applications.	9
<b>Total Instructional Hours</b>		<b>45</b>

Course Outcome

- CO1:Describe the coupled coil calculate the self and mutually induced emf  
CO2:Analyze the operation of transformer in different loading condition  
CO3:Explain the concept of field energy and co-energy in single and multiple excited systems  
CO4:Demonstrate the construction of D.C machines and operation of DC Generator  
CO5:Derive the performance equation of D.C motor under various load condition

**TEXT BOOKS:**

- T1 Nagrath I. J and Kothari D. P. “Electric Machines”, Fourth Edition, Tata McGraw Hill Publishing Company Ltd, 2010  
T2 B.L Thereja “A Text Book of Electrical Technology”, Volume II, S.Chand publications, 2006

**REFERENCE BOOKS:**

- R1 Rohit Mehta & V K Mehta., ‘Principles of Electrical Engineering’, S. Chand Publishing, 2003.  
R2 Syed A. Nasar, “Electric Machines and Power Systems”, Volume-I, McGraw Hill International Edition , January 1995.



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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EE3202	<b>ELECTRONIC DEVICES AND CIRCUITS (COMMON TO EEE AND EIE)</b>	3	0	0	3

- Course Objective
1. Recall the basics about the 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
	<b>SEMICONDUCTOR DIODE</b>	
I	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
	<b>TRANSISTORS</b>	
II	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
	<b>DESIGN AND ANALYSIS OF SMALL SIGNAL AMPLIFIER</b>	
III	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
	<b>LARGE SIGNAL AMPLIFIERS</b>	
IV	Classification of Power Amplifiers, Efficiency of Class A Amplifier and Class B Complementary - Symmetry, Push - Pull Power Amplifiers- Calculation of Power Output, Efficiency and Power Dissipation - Crossover Distortion.	9
	<b>FEEDBACK AMPLIFIERS AND OSCILLATORS</b>	
V	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
<b>Total Instructional Hours</b>		<b>45</b>

- 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 nature of large signal amplifiers.  
CO5: Outline the concepts of feedback amplifiers, conditions for oscillation and types of oscillators.

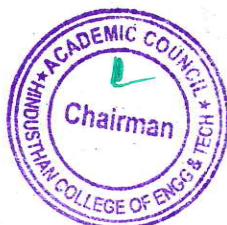
**TEXT BOOKS:**

- T1 R.S.Setha, "Applied Electronics" S.Chand Publications, 2008.  
T2 David A. Bell, "Electronic Devices and Circuits", 5<sup>th</sup> Edition, Prentice Hall Publications, 2008.

**REFERENCE BOOKS:**

- R1 Rashid, "Micro Electronic Circuits" Thomson publications, 1999.  
R2 Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3<sup>rd</sup> Edition, 2003.  
R3 Robert L. Boylestad, "Electronic Devices and Circuit theory", Prentice Hall, 2002.

  
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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EE3203	<b>MEASUREMENTS AND INSTRUMENTATION (COMMON TO EEE AND EIE)</b>	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	<b>CHARACTERISTICS, ERRORS AND STANDARDS OF INSTRUMENTS</b> Functional elements of an instrument - Static and dynamic characteristics - Errors in measurement - Statistical evaluation of measurement data - Standards and calibration.	9
II	<b>MEASURING INSTRUMENTS</b> Principle - Construction - Operation of Moving Coil and Moving Iron Instruments - Ammeters and Voltmeters - Single phase and three phase wattmeters and energy meters - Instrument transformer- Instruments for measurement of frequency and phase.	9
III	<b>COMPARISON METHODS OF MEASUREMENTS</b> 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	<b>STORAGE AND DISPLAY DEVICES</b> Introduction - Magnetic disk and tape recorders - XY Recorders- CRT display- Display storage oscilloscope - LED & LCD display - Inkjet and Dot matrix printer.	9
V	<b>TRANSDUCERS AND DATA ACQUISITION SYSTEMS</b> 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
<b>Total Instructional Hours</b>		<b>45</b>

- 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.

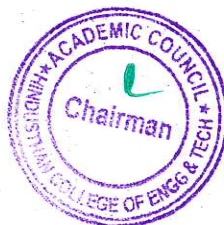
#### TEXT BOOKS:

- 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, Dhanpal 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, II Edition 2004.
- R3 J. B. Gupta, "A Course in Electronic and Electrical Measurements", S. K. Kataria & Sons, 2003.

  
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<b>Programme</b> B.E.	<b>Course Code</b> 16EE3204	<b>Name of the Course</b> ELECTROMAGNETIC THEORY	<b>L</b> 3	<b>T</b> 0	<b>P</b> 0	<b>C</b> 3
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- Course Objective
1. Understand the basic concepts in Electrostatics
  2. To acquire a complete knowledge in Electrostatics
  3. Recognize the concepts in magneto statics
  4. Understand the concepts of Electro Dynamic Fields.
  5. To know the properties and concepts of Electromagnetic waves.

Unit	Description	Instructional Hours
	<b>ELECTROSTATICS – I</b>	
I	Electrostatic fields - sources and effects of electromagnetic fields – Introduction to various coordinate Systems(Cartesian Coordinate, Polar Coordinates) – Vector fields –Vector Calculus Gradient, Divergence, Curl – theorems and applications - Coulomb’s Law – Electric field intensity – Field due to discrete and continuous charges – Gauss’s law Proof of Gauss’s law and applications of gauss law.	9
	<b>ELECTROSTATICS – II</b>	
II	Potential due to point charge –Electric Field Intensity- Electric field and equipotential points, Uniform and Non-Uniform field, Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson’s and Laplace’s equations, Capacitance, Energy density, Applications.	9
	<b>MAGNETOSTATICS</b>	
III	Magnetic field intensity (H) - Lorentz force – Biot-Savart’s Law - Ampere’s Circuit Law – point form of Ampere’s Circuital Law-- H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media – Boundary conditions, scalar and vector potential, Poisson’s Equation, Magnetic force, Torque, Inductance, Energy density, Applications.	9
	<b>ELECTRODYNAMIC FIELDS</b>	
IV	Self Inductance and Mutual Inductance - Magnetic Circuits - Faraday’s law – Transformer and motional EMF – Displacement current -Maxwell’s equations (differential and integral form) Relation between field theory and circuit theory –Applications	9
	<b>ELECTROMAGNETIC WAVES</b>	
V	Electromagnetic waves propagation concepts – Plane Electromagnetic wave Equation – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors and Dielectrics – Velocity, Wave Length, Intrinsic Impedance and skin depth - Poynting Theorem – Poynting Vector and its Significance – Plane wave reflection and refraction – Standing Wave – Applications.	9
	<b>Total Instructional Hours</b>	<b>45</b>

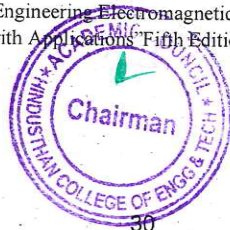
- Course Outcome
- CO1: Apply the Vector calculus application in Electromagnetics  
CO2: Analyse the concepts of Electromagnetics  
CO3: Evaluate the concepts of Magnetostatics  
CO4: Analyse the propagation of plane Electromagnetic wave.  
CO5: Compare the concepts of Plane wave reflection, refraction and penetration.

**TEXT BOOKS:**

- T1 Mathew N. O. Sadiku, ‘Principles of Electromagnetics’, 4 th Edition ,Oxford University Press Inc. First India edition, 2009.
- T2 K.A. Gangadhar, P.M. Ramanathan ‘ Electromagnetic Field Theory (including Antennaes and wave propagation’, 16th Edition, Khanna Publications, 2007.

**REFERENCE BOOKS:**

- R1 Joseph. A.Edminister, ‘Schaum’s Outline of Electromagnetics, Third Edition (Schaum’s Outline Series), Tata McGraw Hill, 2010
- R2 William H. Hayt and John A. Buck, ‘Engineering Electromagnetics’, Tata McGraw Hill 8<sup>th</sup> Revised edition, 2011.
- R3 Kraus and Fleish, “Electromagnetics with Applications” Fifth Edition, Mc Graw Hill International Edition, 2010.



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Programme B.E.	Course Code 16EE3205	Name of the Course POWER PLANT ENGINEERING	L 3	T 0	P 0	C 3
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Course Objective	<ol style="list-style-type: none"> <li>1. Identify various sources of energy and types of power plants.</li> <li>2. Describe the layout and various components of operation of hydro electric power plants.</li> <li>3. Recognize the various components and operation of steam electric power plants.</li> <li>4. Understand the layout and various components of nuclear power plants.</li> <li>5. Gain knowledge on various components and operation of diesel and gas power plants</li> </ol>
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Unit	Description	Instructional Hours
	<b>FUNDAMENTALS OF POWER PLANT</b>	
I	Introduction to Various Sources of Energy: Conventional and Non Conventional - Classification of Power Plants - Resources for Power Generation - Classification of Power Plant Cycle : Rankine Cycle, Reheat Cycle and Regenerative Cycle - Law of Conservation of Energy.	9
	<b>HYDRO POWER PLANTS</b>	
II	Layout of Hydro power plants – Classification of Hydro-Plant – Turbines - Impulse turbines, Reaction turbines and Francis turbine - Run-Off - Selection of site for a hydro-electric power plant – Surface Power house – Under-Ground power house – Types - Advantages & Disadvantages	9
	<b>STEAM POWER PLANT</b>	
III	Layout of Steam Power Plants - Fuel and Ash handling systems – Combustion equipment for steam boilers – Mechanical stokers – Pulverized coal and firing – Electrostatic precipitator – IDF and FDF – Steam condensers	9
	<b>NUCLEAR POWER PLANTS</b>	
IV	Nuclear energy concepts and terms: Fission, Fusion reaction - Layout of nuclear power plants - Types of Nuclear reactors, pressurized water reactor - Boiling water reactor - Gas cooled reactor – CANDU reactor- Breeder reactor - Chernobyl nuclear power plant	9
	<b>DIESEL AND GAS TURBINE POWER PLANTS</b>	
V	Introduction - operating principle – types of IC Engine - Layout of Diesel power plants - Performance of diesel engine - applications. Gas Turbine power plant – Classifications - Elements of gas turbine power plant – Merits –Regeneration and Reheating – Cogeneration-Case study-18 <sup>th</sup> Electric power survey of India.	9
<b>Total Instructional Hours</b>		<b>45</b>

Course Outcome	<p>CO1: Select the appropriate power plant and its components based on requirement and Environmental aspects and power plant cycles.</p> <p>CO2: Explain the concepts of various turbines in hydro power plant and importance of surface and underground power plants.</p> <p>CO3: Explain the function of various equipments in steam power plant.</p> <p>CO4: Illustrate the concepts of different types of reactors used in nuclear power plant.</p> <p>CO5: Explain the function of various equipments in diesel and gas power plants.</p>
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**TEXT BOOKS:**

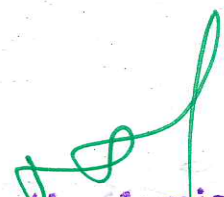
- T1 A.K. Raja.,Amit P. Srivastava.,Manish Dwivedi., “Power Plant Engineering” New age International (P) Limited, Publishers , New Delhi – 110002, 2006
- T2 El-Wakil M.M., “Power Plant Technology”, 2<sup>nd</sup> Edition, Tata McGraw Hill, New Delhi, 2010.

**REFERENCE BOOKS:**

- R1 G.D. Rai, “Introduction to Power Plant Technology”, 3<sup>rd</sup> Edition, Khanna Publishers, New Delhi, 2013.
- R2 Nag P.K., “Power Plant Engineering”, 4<sup>th</sup> Edition, Tata-McGraw Hill Education, New Delhi, 2014.
- R3 R.K. Rajput, “A Text Book of Power Plant Engineering”, 4<sup>th</sup> Edition, Laxmi Publications, 2013.

  
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Programme B.E.	Course Code 16MA4107	Name of the Course NUMERICAL METHODS (COMMON TO AERO, AUTO, MECH, EEE & EIE)	L 3	T 1	P 0	C 4
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- 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
	<b>SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS</b>	
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
	<b>INTERPOLATION</b>	
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
	<b>NUMERICAL DIFFERENTIATION AND INTEGRATION</b>	
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
	<b>INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS</b>	
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
	<b>BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS</b>	
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
	<b>Total Instructional Hours</b>	<b>60</b>

- 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.

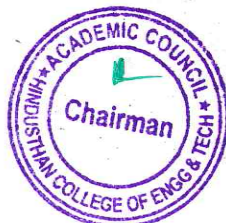
**TEXT BOOKS:**

- T1 Sankara Rao K, “Numerical Methods for Scientists and Engineers”, 3<sup>rd</sup> 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 “, 6<sup>th</sup> Edition , Khanna publishers, New Delhi 2004.

  
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Programme B.E.	Course Code 16EE4201	Name of the Course <b>INDUCTION AND SYNCHRONOUS MACHINES</b>	L 3	T 1	P 0	C 4
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- Course Objective
1. Obtain the performance of three phase induction motor and draw its characteristics.
  2. Understand the working of Starters and speed control techniques of three-phase induction motors.
  3. Discuss the basic principles and determine the performance of single phase induction motor.
  4. Obtain the performance of three phase synchronous generator.
  5. Estimate the excitation in synchronous motor at various load conditions.

Unit	Description	Instructional Hours
I	<b>THREE PHASE INDUCTION MOTORS</b> Construction - Principle of operation - slip and Frequency of rotor currents - Equivalent circuit - Power across air-gap, Torque & Power output - Torque-slip characteristics - No load and Blocked rotor tests - Circle diagram (approximate) - Cogging and Crawling - Braking: Plugging, dynamic braking and regenerative braking - Induction generator - problems - Applications.	12
II	<b>STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTORS</b> Starting methods of three phase induction motor - Need for starting - Types of starters DOL, Rotor resistance, Autotransformer and Star-Delta starters - Speed control techniques - Voltage control - Pole changing - Frequency control - Rotor resistance control - Slip power recovery schemes	12
III	<b>SINGLE PHASE INDUCTION MOTORS</b> Single phase induction motors - Double revolving field theory - Types of single phase induction motors - Split phase motor - Capacitor start motor - Capacitor start and run motor - Shaded pole motor. No load and Blocked rotor test - Equivalent circuit - Applications.	12
IV	<b>SYNCHRONOUS GENERATORS</b> Construction - Working of synchronous machine as generator and motor- e.m.f equation - armature reaction - Synchronous reactance - Predetermination of voltage regulation using EMF, MMF, Potier method - parallel operation - Alternator on infinite bus bars - Salient pole synchronous machine - two reaction theory - slip test	12
V	<b>SYNCHRONOUS MOTOR</b> Principle of operation - Torque equation - Starting of Synchronous motors - torque and power developed equations - Effect of change in excitation and load on synchronous motor - V curves and inverted V curves - Hunting and suppression methods - damper windings - Synchronous condenser.	12
<b>Total Instructional Hours</b>		<b>60</b>

- Course Outcome
- CO1: Analyze and draw the performance characteristics of the three phase induction motor.  
CO2: Demonstrate the starters for starting and control the speed of three phase induction motors.  
CO3: State the fundamentals and evaluate the performance of single phase induction motors.  
CO4: Apply different methods to obtain the regulation of synchronous generator under various load condition.  
CO5: Draw the performance characteristics of synchronous motor under different excitation conditions.

**TEXT BOOKS:**

- T1 D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2006.  
T2 P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003.

**REFERENCE BOOKS:**

- R1 K. Muruges Kumar, 'Induction and Synchronous Machines', Vikas Publishing House Pvt. Ltd, 2009.  
R2 Fitzgerald Kingsley and Umans, "Electric Machinery" 6th Edition, McGraw Hill Books co., New Delhi, 2002.  
R3 Alexander S. Langsdorf, Theory of Alternating-Current Machinery, Tata McGraw Hill Publications, 2001.



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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EE4202	LINEAR INTEGRATED CIRCUITS AND APPLICATIONS(COMMON TO EEE AND EIE)	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's and DAC's.
  4. Impart the basic knowledge of regulator circuits and special function IC's.
  5. Summarise internal functional blocks of special function IC's.

Unit	Description	Instructional Hours
I	<b>IC FABRICATION</b> 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.Diode and FET.	9
II	<b>CHARACTERISTICS OF OP-AMP</b> 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 & I/V converters.	9
III	<b>APPLICATIONS OF OP-AMP</b> 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 : Dual Slope, Successive Approximations.	9
IV	<b>SPECIAL IC's</b> Functional block- characteristics & 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	<b>APPLICATION IC's</b> 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
<b>Total Instructional Hours</b>		<b>45</b>

- 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', II edition, New Age, 2003.  
T2 S.Salivahanan & V.S. Kanchana Bhaskaran," Linear Integrated Circuits", TMH, 2008.

**REFERENCE BOOKS:**

- R1 Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. 2000  
R2 Robert F.Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', PHI Learning, 6th edition, 2012.  
R3 Floyd ,Buchla,"Fundamentals of Analog Circuits, Pearson, 2013.

  
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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EE4203	DIGITAL LOGIC CIRCUITS (COMMON TO EEE AND EIE)	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
	<b>DIGITAL SYSTEM</b>	
I	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
	<b>MINIMIZATION OF LOGIC CIRCUITS</b>	
II	Gate – Level Minimization and combination circuits - The K-Maps 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
	<b>COMBINATIONAL LOGIC CIRCUITS</b>	
III	Design Procedure - Combinational circuit for different code converters and other problems - Binary Adder – subtractor – Multiplier - Magnitude Comparator – Decoders – Encoders – Multiplexers -Demultiplexers	9
	<b>SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL CIRCUITS</b>	
IV	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
	<b>VHDL AND PROGRAMMABLE LOGIC DEVICES</b>	
V	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
<b>Total Instructional Hours</b>		<b>45</b>

- 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 synchronous and asynchronous sequential circuits.
- CO5: Build VHDL program for adders, counters, flip-flops, FSM, Multiplexers / De-multiplexers

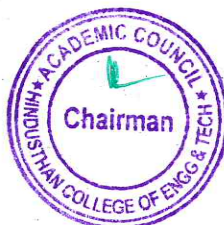
**TEXT BOOKS:**

- 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, PHI; 2013.
- R2 John F. Wakerly, 'Digital Design Principles and Practices', 4<sup>th</sup> edition, PHI Learning Private Ltd.
- R3 Albert Paul Malvino Donald P. Leach, "Digital Principles and Applications, 4<sup>th</sup> edition, Tata Mc Graw-Hill.

  
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<b>Programme</b> B.E.	<b>Course Code</b> 16EE4204	<b>Name of the Course</b> TRANSMISSION AND DISTRIBUTION	<b>L</b> 3	<b>T</b> 0	<b>P</b> 0	<b>C</b> 3
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<b>Course Objective</b>	<ol style="list-style-type: none"> <li>1. Develop expressions for the computation of transmission line parameters.</li> <li>2. Obtain the equivalent circuits for the transmission lines based on distance and operating voltage.</li> <li>3. Improve the voltage profile of the transmission system.</li> <li>4. Analyses the voltage distribution in insulator strings and cables and methods to improve the same.</li> <li>5. Understand the operation of the different distribution schemes</li> </ol>
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Unit	Description	Instructional Hours
I	<b>STRUCTURE OF POWER SYSTEM</b> Structure of electric power system: generation, transmission and distribution; Types of AC and DC distributors –interconnection – EHVAC and HVDC transmission - Introduction to FACTS.	9
II	<b>TRANSMISSION LINE PARAMETERS</b> Parameters of single and three phase transmission lines with single and double circuits - Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects -Typical configurations, conductor types and electrical parameters of EHV lines, corona discharges.	9
III	<b>MODELLING AND PERFORMANCE OF TRANSMISSION LINES</b> Classification of lines - short line, medium line and long line - equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance; transmission efficiency and voltage regulation, real and reactive power flow in lines, surge impedance loading, methods of voltage control; Ferranti effect.	9
IV	<b>INSULATORS AND CABLES</b> Insulators - Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators. Underground cables - Types of cables, Capacitance of Single-core cable, Grading of cables, Power factor and heating of cables, Capacitance of 3- core belted cable, D.C cables.	9
V	<b>MECHANICAL DESIGN OF LINES AND GROUNDING</b> Mechanical design of transmission line – sag and tension calculations for different weather conditions, Tower spotting, Types of towers, SLD of 110/11kV and 230/33kV Substation Layout, Methods of grounding (ICE AND TT).	9
<b>Total Instructional Hours</b>		<b>45</b>

<b>Course Outcome</b>	<p>CO1: Differentiate the types of transmission and distribution systems and illustrate the structure of power system.</p> <p>CO2: Develop the expressions for calculation of transmission line parameters and their effects.</p> <p>CO3: Evaluate the performance of transmission line using T and <math>\pi</math> method.</p> <p>CO4: Analyze the voltage distribution in insulator strings and cables, identify methods to improve the voltage distribution.</p> <p>CO5: Analyze and design tower distance in transmission line by computing sag and tension of line conductor.</p>
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**TEXT BOOKS:**

- T1 S.N. Singh, Electric Power Generation, Transmission and Distribution\*, Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011
- T2 B.R.Gupta, , S.Chand, Power System Analysis and Design\*New Delhi, Fifth Edition, 2008.

**REFERENCE BOOKS:**

- R1 C.L.Wadhwa, Electrical Power Systems\*, New Academic Science Ltd, 2009.
- R2 D.P.Kothari, I.J. Nagarath, Power System Engineering\*, Tata McGraw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.
- R3 V. K. Mehta and R. Mehta, Principles of Power Systems, S. Chand Publishing, New Delhi 4th edition,2009

  
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Programme B.E.	Course Code 16EE4205	Name of the course <b>RENEWABLE ENERGY SOURCES</b>	L 3	T 0	P 0	C 3
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- Course Objective
1. Provide knowledge on fundamentals of Energy scenario
  2. Introduce the different renewable energy sources
  3. Provide knowledge on energy efficient tracking methods
  4. Analyze and design processes for bio fuel production.
  5. Understand the design concepts of renewable energy sources

Unit	Description	Instructional Hours
I	<b>INTRODUCTION</b> World Energy Use – Reserves of Energy Resources – Environmental Aspects of Energy Utilization – Renewable Energy Scenario in Tamil nadu, India and around the World – Potentials – Achievements / Applications – Economics of renewable energy systems.	9
II	<b>SOLAR ENERGY</b> Energy available from Sun, Solar radiation data – solar energy conversion into heat, Flat plate and Concentrating collectors – Principle of natural and forced convection – Photo voltaic: p-n junctions, Solar cells, PV systems, Standalone, Grid connected solar power systems – Calculation of energy through photovoltaic power generation.	9
III	<b>WIND ENERGY</b> Energy available from wind, General formula, Lift and drag – Basis of Wind energy conversion, Effect of density, Frequency variances, Angle of attack, Wind speed – Windmill rotors, Horizontal axis and Vertical axis rotors, Determination of torque coefficient, Induction type generators – Working principle of wind power plant.	9
IV	<b>BIO ENERGY</b> Biomass conversion – wet and dry processes – Photosynthesis – Materials for Biogas generation – Biogas plants, Drum type, Dome type – Classification of Biomass gasifiers – Alternative Liquid fuels – Ethanol, methanol production – Biomass Applications	9
V	<b>OTHER RENEWABLE ENERGY</b> Tidal energy – Wave Energy – Open and Closed OTEC Cycles – Small Hydro – Geothermal Energy – Hydrogen and Storage – Fuel Cell Systems – Cogeneration – Hybrid Systems.	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome
- CO1: Investigate the energy economics using research based knowledge  
CO2: Demonstrate the applications of solar PV systems  
CO3: Illustrate the working of wind energy conversion systems  
CO4: Analyze and design processes for bio fuel production.  
CO5: Illustrate the working of different non conventional energy sources.

**TEXT BOOKS:**

- T1 Rai. G.D., "Non Conventional Energy Sources", Khanna Publishers, New Delhi, 2011.  
T2 Twidell, J.W. & Weir, A., "Renewable Energy Sources", EFN Spon Ltd., UK, 2006.

**REFERENCE BOOKS:**

- R1 Sukhatme. S.P., "Solar Energy", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997  
R2 Freris. L.L., "Wind Energy Conversion Systems", Prentice Hall, UK, 1990.  
R3 David M. Mousdale – "Introduction to Biofuels", CRC Press, Taylor & Francis Group, USA 2010.

  
**Chairman - BoS**  
**EEE - HICET**



  
**Dean (Academics)**  
**HICET**

Programme B.E.	Course Code 16EE4001	Name of the Course INDUCTION AND SYNCHRONOUS MACHINES LABORATORY	L 0	T 0	P 4	C 2
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**COURSE OBJECTIVE**

1. Study the operation of AC Machines and starters.
2. Determine the losses and performance characteristics in Induction Motor.
3. Determine the regulation of synchronous machines.

**EXPT.NO**

**Description of the Experiments**

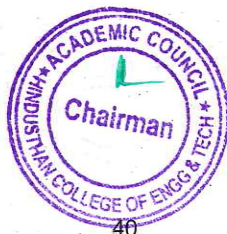
1. Load test on three-phase Squirrel cage induction motor/ Slip ring induction motor
2. No load and blocked rotor test on three-phase induction motor (Determination of equivalent circuit parameters).
3. Separation of No-load losses of three-phase induction motor
4. Speed control of three phase Squirrel cage Induction Motor (Stator Voltage control).
5. Determination of performance parameters of induction motor using circle diagram
6. Load test on single-phase induction motor.
7. No load and blocked rotor test on single-phase induction motor.
8. Regulation of three phase alternator by EMF and MMF method.
9. Regulation of three phase alternator by ZPF method.
10. Determination of  $X_d$  and  $X_q$  for three phase salient pole alternator by slip test.
11. V and Inverted V curves of Three Phase Synchronous Motor.
12. Study of Induction motor starter ( DOL, Automatic Star/Delta )

**Total Practical Hours** 45

**Course Outcome**

- CO1: Perform load test on Induction motors and comment their performance characteristics.
- CO2: Predetermine the regulation of three phase alternator by EMF, MMF, and ZPF and slip test.
- CO3: Draw the performance characteristics of three phase synchronous motor
- CO4: Execute no load and blocked rotor test on induction motors to draw equivalent circuit.
- CO5: Analyse and calculate the losses of three phase induction motor

  
**Chairman - BoS**  
**EEE - HICET**



  
**Dean (Academics)**  
**HICET**

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16EE4002	LINEAR AND DIGITAL INTEGRATED CIRCUIT LABORATORY (COMMON TO EEE AND EIE)	0	0	4	2

- Course Objective
1. Impart the knowledge on Boolean function/ code converter/ D to A
  2. Develop capacity to analyze the functions of encoder and decoder/ multiplexer/ shift register
  3. Make the students to understand 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**  
**EEE - HICET**



  
**Dean (Academics)**  
**HICET**

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

### Semester – I R2016

#### Course Code & Name 16MA1101- Engineering Mathematics-I

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

#### Course Code & Name 16PH1101- Engineering Physics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

#### Course Code & Name 16CY1101- Engineering Chemistry

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

#### Course Code & Name 16HE1101R- Essential English for Engineers -I

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

**Course Code & Name 16GE1101- Computer Programming**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

**Course Code & Name 16ME1201- Basics of Civil and Mechanical Engineering**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

**Course Code & Name 16GE1001- Computer Programming Lab**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		2									
CO2	3	3	3	3									2	
CO3	3	3	3	3									2	
CO4	3	3	3	3			2		2			2	2	
CO5	3	3	3	3				0	2	2	2		2	
Avg	3	3	3	2.4	0.4	0	0.4	0	0.8	0.4	0.4	0.4	1.6	0

**Course Code & Name 16GE1002- Engineering Practices Laboratory**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3	3	-	-	-	-	-	-	1	1	-	-	1	1	1
CO4														
CO5														
Avg	1	0	0	0	0	0	0	0.33	0.33	0	0	0.33	0.33	0.33

## SEMESTER II

### Course Code & Name 16MA2102- Engineering Mathematics-II

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

### Course Code & Name 16PH2102- Physics of Materials

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

### Course Code & Name 16CY2102- Environmental Sciences

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

### Course Code & Name 16HE2102R- Essential English for Engineers -II

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

**Course Code & Name** 16GE2102- Engineering Graphics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	1	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
Avg	1.4	2	2	1.2	0	0	0	0	0.2	0	0	0.2	1.8	1.8

**Course Code & Name** 16EE2201- Electrical Circuit Theory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	3				-	-	-	-	1	-	-	-	1	1
CO2	2				-	-	-	-	-	-	-	-	2	2
CO3	3	2			-	-	-	-		-	-	-	3	3
CO4	3	2		-	-	-	-	-	-	-	-	-	1	1
CO5	3	2			-	-	-	-	-	-	-	1	2	2
Avg	2.8	1.2	0	0	0	0	0	0	0.2	0	0	0.2	1.8	1.8

**Course Code & Name** 16EE2001- Electrical Circuit Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	3			3									3	
CO2	2			3									3	
CO3	3			3									3	
CO4	3			3									3	2
CO5	3			3									3	2
Avg	2.8	0	0	3	0	0	0	0	0	0	0	0	3	0.8

**SEMESTER III**

**Course Code & Name** 16MA3103- Fourier Analysis and Statistics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
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





**Course Code & Name 16EE3205- Power Plant Engineering**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	2	3	3		2									2
CO2	3	3	3		3									2
CO3	3	3	3		3	2								2
CO4		2	3		3	2								2
CO5		2	3		3	2								2
Avg	2.6	2.6	3		2.8	2								2

**Course Code & Name 16EE3001- Transformers and DC Machines Laboratory**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1								3	1			2	
CO2	2								3	1			2	
CO3	3								3	1			2	
CO4	2								3	1			2	
CO5	2								3	1			3	
Avg	2								3	1			2.2	

**Course Code & Name 16EE3002- Electronic Devices and Circuits Laboratory**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	3	2							3					3
CO2	2		2						3					3
CO3	3		3						3					3
CO4	3								3					2
CO5	3								3				3	3
Avg	2.8	2	2.5						3				3	2.8

**SEMESTER IV**

**Course Code & Name 16MA4107 - Numerical Methods**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
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



**Course Code & Name 16EE4205- Renewable Energy Sources**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	2		3		2	3								
CO2	3		3		2									2
CO3	3		3		2									2
CO4	2		3		2									2
CO5	2		3		2									2
Avg	2.4		3		2	3								2

**Course Code & Name 16EE4001- Induction and Synchronous Machines Laboratory**

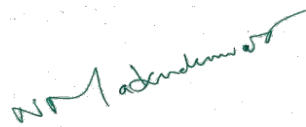
PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1		3	3		3	2							1	
CO2		3	3		3	2							2	
CO3		3	3		3	3							1	
CO4		3	3		3	3							2	
CO5			2										3	
Avg		3	2.8		3	2.5							1.8	

**Course Code & Name 16EE4002- Linear and Digital Integrated Circuits Laboratory**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1		2							3				3	
CO2	2	3							3				2	
CO3	3	2							3				3	
CO4		3							3				3	
CO5	2								2				2	
Avg	2.33	2.5							2.8				2.6	



**Chairman Board of Studies**



**Dean - Academics**