E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with „A" Grade | Accredited by NBA

NAGAPATTINAM – 611 002

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

Full Time Curriculum and Syllabus

First Year – First Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1901MA103	Engineering Mathematics – I (Calculus and Differential Equations)	3	2	0	4	40	60	100
1901PH102	Wave, Optics and Electromagnetism	3	0	0	3	40	60	100
1901GE101	Electric Circuit Analysis	3	0	0	3	40	60	100
1901GEX02	Engineering Graphics	2	0	2	3	50	50	100
Laboratory Course								
1901GEX51	CAD Laboratory	0	0	2	1	50	50	100
1901GEX53	Basic Electrical and Electronics Engineering Lab	0	0	2	1	50	50	100
1901PHX51	Engineering Physics Lab	0	0	2	1	50	50	100
1901GE151	Engineering Intelligence-I	0	0	2	1	100	0	100
Total		**11**	**2**	**10**	**17**	**420**	**380**	**800**

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1901MA103 **Engineering Mathematics – I** L T P C
(Calculus And Differential Equations) **3 2 0 4**

Aim of the course:
This course focuses on acquiring sound knowledge of techniques involved in application of differentiation needed for problems in all engineering disciplines, develop an understanding of the standard techniques of integral calculus, practice in solving differential equations so as to enable the student to apply them with confidence, exercise Fourier series in wave formation and signal transmission, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current to handle the problem that is being investigated

PREREQUISITES: Differentiation, Integration, Differential equations

COURSE OUTCOMES

After completion of this course, students can able to

- **CO1** Solve Derivative of special functions and apply it in solving Geometrical problems
- **CO2** Teach the area and volume of a curve using double and triple integration
- **CO3** Use and solve Higher order Ordinary Differential Equations
- **CO4** Use Fourier series analysis which is central to many applications in engineering
- **CO5** Solve boundary value problem using partial differential equation

MODULE I **DIFFERENTIAL CALCULUS** **12 Hours**

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature- Evolutes and involutes.

MODULE II **INTEGRAL CALCULUS** **12 Hours**

Double integration – Cartesian and polar coordinates – Change the order of Integration – Applications: Area of a curved surface using double integral – Triple integration in Cartesian co-ordinates – Volume as triple integral.

MODULE III **ORDINARY DIFFERENTIAL EQUATIONS** **12 Hours**

Higher order linear differential equations with constant coefficients – Cauchy‟s and Legendre‟s linear equations – Method of variation of parameters in solution of ordinary differential equations

MODULE IV **FOURIER SERIES** **12 Hours**

Dirichlet‟s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval‟s identity – Harmonic analysis.

MODULE V **APPLICATION OF PARTIAL DIFFERENTIAL EQUATIONS** **12 Hours**

Variable separable methods-classification-one dimensional wave equation with and without velocity-one dimensional heat equation.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

REFERENCES:

1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2018.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. G.F. Simmons and S.G. Krantz, “Differential Equations”, McGraw Hill, 2007.
6. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

		L	T	P	C
1901PH102	**WAVE, OPTICS AND ELECTROMAGNETISM**	**3**	**0**	**0**	**3**

Aim of the course:

To make students understand the importance of wave optics and electromagnetism in engineering applications

COURSE OUTCOME

- **CO1** Apply the conditions for wave propagation in electrical oscillators and harmonic oscillators
- **CO2** Apply the concepts of wave formation in strings, its reflection and transmission at boundaries
- **CO3** Apply the criterion for resolution of light in diffraction gratings and interferometers
- **CO4** Solve equations for electrostatic potentials and electric displacement conditions in practical cases
- **CO5** Determine the magnetic flux due to ferromagnets and its susceptibility

MODULE I WAVES **9 Hours**

Mechanical and electrical simple harmonic oscillators- damped harmonic oscillator- forced mechanical and electrical oscillators – impedance - steady state motion of forced damped harmonic oscillator

MODULE II NON-DISPERSIVE TRANSVERSE AND LONGITUDINAL WAVES **9 Hours**

Transverse wave on a string - The wave equation on a string - Harmonic waves - reflection and transmission of waves at a boundary - impedance matching, standing waves and their Eigen frequencies - longitudinal waves and the wave equation.

MODULE III WAVE OPTICS **9 Hours**

Interference of light by wave front splitting and amplitude splitting - Young‟s double slit experiment - Michelson interferometer - The Rayleigh criterion for limit of resolution and its application to vision - Diffraction gratings and their resolving power.

MODULE IV ELECTROSTATICS **9 Hours**

Calculation of electric field and electrostatic potential for a charge distribution - Laplace‟s and Poisson‟s equations for electrostatic potential- Practical examples like Faraday‟s cage and coffee-ring effect Electrostatic field and potential of a dipole - Electric displacement; boundary conditions on displacement - applications in photoconductors - Smoke precipitator and electrostatic air cleaners

MODULE V MAGNETOSTATICS **9 Hours**

Bio-Savart law - Divergence and curl of static magnetic field; vector potential and magnetic field using Stokes‟ theorem - Equation for the vector potential and its solution for given current densities - Solving for magnetic field due to simple magnets like a bar magnet - Magnetic susceptibility and ferromagnetic-paramagnetic and diamagnetic materials - applications: measurement of magnetic flux density - Frequency modulation - DC measurements and Magnetic field measurements in permanent magnets.

TOTAL: 45 HOURS

REFERENCES:

1. I. G. Main, “Vibrations and waves in physics”, Cambridge University Press, 1993.
2. H. J. Pain, “The physics of vibrations and waves”, Wiley, 2006.
3. E. Hecht, “Optics”, Pearson Education, 2008.
4. A. Ghatak, “Optics”, McGraw Hill Education, 2012.
5. O. Svelto, “Principles of Lasers”, Springer Science & Business Media, 2010.
6. David Griffiths, Introduction to Electrodynamics
7. Halliday and Resnick, Physics
8. W. Saslow, Electricity, magnetism and light

		L	T	P	C
1901GE101	**ELECTRIC CIRCUIT ANALYSIS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

1. To know about the basics of electric circuits
2. To impart knowledge on solving circuits using network theorems
3. To introduce the phenomenon of resonance and coupled circuits
4. To determine the transient response of circuits
5. To analyze three phase circuits

COURSE OUTCOMES:

On the Successful completion of the course, Students will be able to

- **CO1** Apply the knowledge of basic circuital laws and simplify the network using reduction technique
- **CO2** Design simple networks for the complex network by exploring circuit theorems
- **CO3** Design and test the DC and AC transients circuits using test signal
- **CO4** Design and test circuit for a desire cut off frequency using resonant and coupled circuits
- **CO5** Determine the attenuate circuit using two port network

MODULE I DC CIRCUITS **6 Hours**

Ohm‟s law and Kirchhoff‟s laws - Mesh Analysis - Node Analysis - Network reduction - Voltage and current division - Source transformation - Star-delta conversion.

MODULE II AC CIRCUITS **7 Hours**

RMS, average, form factor and peak factor for basic waveforms - Steady state analysis of RL, RC and RLC circuits; power and power factor - Solving AC circuits using mesh and node analysis - Three phase circuits.

MODULE III NETWORK THEOREMS **7 Hours**

Superposition theorem, Thevenin‟s theorem, Norton‟s theorem, Reciprocity theorem, Millman‟s theorem and Maximum power transfer theorem; applications of network theorems.

MODULE IV RESONANT CIRCUITS **7 Hours**

Series, parallel, series-parallel circuits; effect of variation of Q on resonance; Relations between circuit parameters - Quality factor, resonant frequency and bandwidth.

MODULE V COUPLED CIRCUITS **7 Hours**

Self and mutual inductances, coefficient of coupling, dot convention; analysis of simple coupled circuits, inductively coupled circuits; single tuned and double tuned circuits.

MODULE VI TRANSIENT ANALYSIS **7 Hours**

Transient response of RL, RC and RLC circuits to DC and AC excitation; Natural and forced oscillations; Laplace transform application to transient solution.

MODULE VII TWO PORT NETWORKS **4 Hours**

Z, Y, H and ABCD parameters.

TOTAL: 45 HOURS

REFERENCES:

1. A.Sudhakar and S.P. Shyammohan, “Circuits and Networks: Analysis and Synthesis”, TMH, 4th Edition, 2010.
2. M.Nahvi and Joseph A.Edminister, “Electric Circuits”, Schaum‟s Outline series, Tata McGrawHill, New Delhi, 6th Edition, 2014.
3. James W. Nilsson and Susan Riedel, “Electric Circuits”, Pearson, 10th Global Edition, 2014.
4. William H. Haytand Jack Kemmerly, “Engineering circuit analysis”, Tata McGrawHill, 8th Edition, 2013.
5. Charles. K.Alexander and Mathew N.O.Sadiku, “Fundamental of Electric Circuits”, TMH, 5thEdition, New Delhi, 2013.
6. S.N. Sivanandam, “Electric Circuit Analysis”, Vikas Publishing House Pvt. Ltd., New Delhi, 2nd Edition, 2008.
7. T.S.K.V IYER, “Theory and Problems in Circuit Analysis”, Tata McGrawHill, 2nd edition, 2010.
8. A.Chakrabarti, “Circuits Theory: Analysis and Synthesis”, Dhanpat Rai& Co., 2014 Edition.

1901GEX02	ENGINEERING GRAPHICS	L	T	P	C
	(Common for all B.E./B.Tech. Programme)	**2**	**0**	**2**	**3**

COURSE OBJECTIVES:

1. To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
2. To expose them to existing national standards related to technical drawings

COURSE OUTCOMES:

- **CO1** Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- **CO2** Do orthographic projection of lines and plane surfaces.
- **CO3** Draw projections, solids, and development of surfaces
- **CO4** Draw projections, solids, and development of surfaces
- **CO5** Prepare isometric and perspective sections of simple solids.
- **CO6** Demonstrate computer aided drafting

MODULE I CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

MODULE II PLANE CURVES AND FREE HAND SKETCHING 9 Hours

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of Objects.

MODULE III PROJECTION OF POINTS, LINES AND PLANE SURFACES 9 Hours

Orthographic projection- principles-Principal Planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

MODULE IV PROJECTION OF SOLIDS 9 Hours

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

MODULE V PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 9 Hours

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the 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 cylinders and cones.

MODULE VI ISOMETRIC AND PERSPECTIVE PROJECTIONS 9 Hours

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

TOTAL: 45 HOURS

REFERENCES:

1. Gopalakrishna K.R., "Engineering Drawing" (Vol. II & I combined), Subhas Stores, Bangalore, 2016.
2. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B. and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2015.
4. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2017.
5. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2015.
6. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill, New Delhi, 2008.
7. Bhatt N.D. and Panchal V.M. "Engineering Drawing",Charotar Publishing House, 50th Edition, 2016.

1901GEX51	CAD LABORATORY (COMPUTER AIDED DRAFTING)	L	T	P	C
		0	0	2	1

(Common for all B.E./B.Tech. Programme)

COURSE OUTCOME

CO1 Study of various drafting and modeling
CO2 Illustrate the text and projection symbol with different curves.
CO3 Illustrate the top, front view of solids and objects.
CO4 Illustrate sectional views of prism, pyramid, cylinder, cone, isometric projection.
CO5 Creation of 3-D models of simple objects

List of Experiments:

Basics commands of a CAD software- two-dimensional drawing, editing, layering and dimensioning - coordinate Systems-Drawing practice - orthographic views of simple solids using CAD software.

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using B-spline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
7. Drawing isometric projection of simple objects.
8. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Total: 30 Hours

References:

1. N.D. Bhatt, Machine Drawing, Charotar Publishing House Pvt. Ltd., 2014.
2. P.S. Gill, A Textbook of Machine Drawing, Katson books, 2013.
3. R.K. Dhawan, A Textbook of Machine Drawing, S. Chand, 2012.
4. K.C. John, Textbook of Machine Drawing, PHI Learning Pvt. Ltd., 2009.

1901GEX53	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY (Common for all B.E./B.Tech. Programme)	L	T	P	C
		0	0	2	1

COURSE OBJECTIVE

1. To conduct experiments on electrical & electronics circuits for the verification of laws and functions of gates.
2. To study electrical wirings and earthing.

COURSE OUTCOME:

1. Demonstrate the verification of laws & logic gates in electrical electronics circuits.
2. Make use of different electrical wiring and energy conservation in electrical network.
3. Demonstrate the functions of various ICs
4. Conduct the speed control characteristics of dc motor
5. Measure the earth resistance for safety precautions.

List of Experiments:

1. Experiments related to verification of Ohm‟s law and Kirchhoff‟s laws
2. Experiments involving logic gates
3. Fan and light control using regulators
4. Design of 6V regulated power supply
5. Energy conservation demonstration experiment using energy meter
6. Waveform generation and calculation of rms and average values
7. IC 555 and IC 741 based experiments
8. Experiments in earthing
9. Staircase wiring and residential building wiring
10. Speed control of DC shunt motor

Total: 30 Hours

References:

1. Edward Hughes, " Electrical Technology,", Pearson Education
2. D.P. Kothari and Nagrath "Basic Electronics", MH Education 2013.
3. Paul Scherz and Simon Monk "Practical Electronics for inventors" Mc Graw Hill Publications 2013.

1901PHX51	ENGINEERING PHYSICS LAB	L	T	P	C
	(Common for all B.E./B. Tech. Programme)	**0**	**0**	**2**	**1**

COURSE OUTCOMES

CCO1	Apply the theoretical concepts of physics in procedures and techniques in performing the experiments
CO2	Apply and demonstrate, thermal conductivity, electrical properties of metals and semiconductors, elastic properties of materials and oscillations
CO3	Demonstrate the use of monochromatic light, lasers in optical fiber communication and quantum mechanics towards specific engineering
CO4	Use different measuring devices/ meters to record the data with precision and apply the mathematical concepts/equations to obtain quantitative
CO5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

List of Experiments:

1. Determination of wavelength of various colours of mercury spectrum using Laser grating
2. Determination of velocity of liquids using ultrasonic interferometer
3. Determine the dispersive power of a prism using spectrometer
4. Determine the unknown resistance of the given wire using Carey-Foster‟s Bridge
5. Determine the band gap of the given semiconductor
6. Determine the acceptance angle and particle size using Laser
7. Torsional pendulum – Rigidity modulus of a steel wire
8. Thickness of a thin wire – Air Wedge
9. Measurement of Young‟s modulus – Uniform and Non-uniform bending
10. Thermal conductivity –Lee‟s Disc method

Total: 30 Hours

References:

1. „Practical Physics‟, R.K. Shukla, Anchal Srivastava, New age international (2011)
2. „B.Sc. Practical Physics‟, C.L Arora, S. Chand &Co. (2012)

1901GE151	Engineering Intelligence-I (Common for all B.E./B.Tech. Programme)	L 0	T 0	P 2	C 1

Course Outcome

On the successful completion of the course, students will be able to

1. Describe the Fundamentals of Inter-personal Communication.
2. develop the Activities on Reading Comprehension
3. develop the Activities on Writing Skills
4. To develop the Activities on Presentation Skills
5. To develop the Activities on Soft Skills

List of Experiments:

1. **Activities on Fundamentals of Inter-personal Communication**

Starting a conversation - responding appropriately and relevantly - using the right body language - Role Play in different situations & Discourse Skills- using visuals.

2. **Activities on Reading Comprehension**

General Vs Local comprehension, reading for facts, guessing meanings from context, Scanning, skimming, and inferring meaning, critical reading & effective googling.

3. **Activities on Writing Skills**

Structure and presentation of different types of writing - letter writing/ Resume writing/e-correspondence/ Proposal writing/Technical report writing/ Portfolio writing - planning for writing - improving one's writing.

4. **Activities on Presentation Skills**

Oral presentations (individual and group) through JAM sessions / seminars / PPTs and written presentations through posters/ projects/ reports/ e-mails/ assignments etc.- creative and critical thinking.

5. **Activities on Soft Skills**

Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation-Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conferencing and Mock Interviews-Time management-stress management –paralinguistic features- Multiple intelligences – emotional intelligence – spiritual quotient (ethics) – intercultural communication – creative and critical.

Total: 30 Hours

References:

1. Raman, Meenakshi and Sangeetha Sharma, “Technical Communication: Principles and Practice”, Oxford University Press, New Delhi, 2011.
2. Sudha Rani, D , “Advanced Communication Skills Laboratory Manual” , Pearson Education 2011.
3. Paul V. Anderson ,“Technical Communication”,. Cengage Learning pvt. Ltd. New Delhi, 2007.
4. “English Vocabulary in Use series”, Cambridge University Press 2008.
5. “Management Shapers Series” ,Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. Rizvi and Ashraf M., “Effective Technical Communication”, Tata McGraw Hill, New Delhi, 2005.
7. Jones, D, “The Pronunciation of English”, CUP, . Cambridge,2002.