SYLLABUS

FOR

SEMESTER FOURTH

Course Code	**BSCEE401**			**Semester**	**FOURTH**
Category	**Basic Science Course**				
Course Title	**Engineering Mathematics - IV**				
Scheme & Credits	**L**	**T**	**P**	**Credits**	**Max Marks: 100**
	3	**1**	**0**	**4**	
Prerequisites	**Nil**				

Course Objectives:

1. Students will demonstrate basic knowledge of Functions of Complex Variable & Numerical Technique.
2. To make aware students about the importance and symbiosis between Mathematics and Engineering.

S. No	Topics	No. of Hours
I	Finite Difference: Difference Table and its usage. The difference operators Δ,▼ and the operator E. Interpolation: Interpolation with equal intervals, Newton's advancing difference formula. Newton's backward difference formula. Interpolation with unequal intervals. Newton's divided difference formula. Lagrange's interpolation formula	18
II	Central Differences: The central difference operator δ and the over-raging operator μ. Relations between the operators. Gauss forward and backward interpolation formula, Sterling's, Bessel's, Laplace and Everett's formulae	10
III	Numerical solution of algebraic and Transcendental Equations: Graphic Method, Regula- Fast method, Bolzano's Process of bisection of intervals, Newton-Raphson Method and its geometrical significance	10
IV	Numerical Integration: Numerical Integration, General Quadrature Formula, Simpson's one-third and three-eight rules, Weddle's' rule, Hardy's rule, Trapezoidal rule.	8
V	Numerical Solution of ordinary differential equations: Numerical solution of ordinary differential equations, Picard's method. Taylor's series method, Euler's method, Runge- Kutta Method	10
Total number of Hours		**56**

Textbooks:

S. No	Name of Book	Author	Publisher
1	Numerical Methods for Scientists and Engineering	M.K.Jain, S.R.Iyengar & R.K. Jain	New age publishers
2	Mathematical Numerical Analysis	S.C. Scarborough	CBS Publishers & distributors
3	Introductory methods in Numerical Analysis	S.S.Sastry	PHI learning Pvt Ltd
4	Numerical Methods for Mathematics, Sciences and Engg	J. H. Mathews	Prentice hall college division
5	Fundamentals of Mathematical Statistics	S.C.Gupta and V.K.Kapoor	S. Chand

Course Code	**PCCEE402**			**Semester**	**FOURTH**
Category	**Professional Core Course**				
Course Title	**Electrical Machines-1**				
Scheme & Credits	**L**	**T**	**P**	**Credits**	**Max Marks: 100**
	3	**1**	**0**	**4**	
Prerequisites	**Nil**				

Course Objectives:

1. Analyze single phase and three phase transformers circuits.
2. Understand the operation of dc machines.

Unit	Topics	No. of Hours
I	Transformers: Single Phase Transformers: Introduction, classification, construction, electromotive force (e. m. f.) equation, Equivalent circuit model, Phasor diagrams, Losses and efficiency, Voltage regulation,Transformer tests (polarity test, open circuit test and short circuit test), All day efficiency, Frequency response, Parallel operation, Auto-transformers, Excitation phenomenon in transformers	16
II	Three Phase Transformers: Construction, Connections, Open delta, Ratings, Phase Conversions. Special Purpose Transformers: Impedance matching transformers, Isolation transformers, constant current and constant voltage Transformers, Instrument Transformers	8
III	Principles of Electromechanical Energy Conversion: Energy conversion via electric and magnetic fields, Field energy and mechanical force, energy balance, co energy	4
IV	D.C. Generator: Construction, emf equation of D.C. generator, methods of excitation,losses condition for maximum efficiency, Commutation & armature reaction, interpoles and compensating winding, characteristics of D.C. generators	14
V	D.C. Motor: Working principle, voltage equation, torque developed, operating characteristics of D.C. motor, starting ,3 point and 4 point starter, speed control methods, Swinburne's and brake test, Application areas of D.C. Motors	14
Total Number of Hours		**56**

Textbooks:

S. No	Name of Book	Author	Publisher
1	Electric Machinery	Fitzgerald, Kingslay, Umans	Tata McGraw-Hill
2	Electric Machinery Fundamentals	Chapman	McGraw-Hill
3	Electric Machines	Nagrath and Kothari	Tata McGraw-Hill
4	Basic Electric Machines	Vincent Deltoro	Prentice Hall

Course Code	**PCCEE403**			**Semester**	**FOURTH**
Category	**Professional Core Course**				
Course Title	**Control Systems**				
Scheme & Credits	**L**	**T**	**P**	**Credits**	**Max Marks: 100**
	3	**1**	**0**	**4**	
Prerequisites	**Nil**				

Course Objectives:

1. **Understand the modelling of linear-time-invariant systems using transfer function**
2. **Understand The concept of stability and its assessment for linear-time invariant systems**
3. **Design simple feedback controllers.**

Unit	Topics	No. of Hours
I	Introduction to continuous control systems: Definition of a control system, open-loop, closed loop (automatic and manual) control. Mathematical modeling: Transfer functions, block diagrams, Mason's signal flow graph	13
II	First and second order system: Example of first and second order systems, responses of these systems to step, ramp, parabolic and sinusoidal inputs, transient, steady state and error analysis	12
III	Stability studies: Definition of stability, stability and pole locations, Routh Table	10
IV	Frequency response: Bode plot, polar plot, Nyquist's criterion, root locus.	11
V	Proportional, Integral, Derivative (P.I.D) control. Compensator design Lead – lag compensators. Modelling of dynamic systems in state space (Introduction).	10
Total number of Hours		**56**

Textbooks:

S. No	Name of Book	Author	Publisher
1	Control Systems Engineering	Norman S. Nise	John wiley
2	Control systems(Principles and Design)	M. Gopal	Tata McGraw-Hill
3	Control systems	A. Anand Kumar	PHI Learning Private limited
4	Feedback control of dynamic systems	Franklin and Powel.	Prentice Hall
5	Design of feedback control systems	Stefani	Oxford university press

Course Code	PCCEE404			Semester	FOURTH
Category	Professional Core Course				
Course Title	Electrical Measurement				
Scheme & Credits	L	T	P	Credits	Max Marks: 100
	3	1	0	4	
Prerequisites	Nil				

Course Objectives:

1. Learning the basic terminologies used in electrical measurements
2. Underlying principle of operation of measuring instruments
3. Instruments used for measurement of electrical quantities

Unit	Topics	No. of Hours
I	Definition of basic terms used in measurements. Electro-mechanical indicating instruments: Classification, effects utilized in measuring instruments, errors and their types, various forces in an electro-mechanical indicating instrument, various methods of damping,	12
II	Galvanometers, Ammeters and Voltmeters (PMMC, Induction, Electrostatic and Dynamometer type), mathematical theory of the D'Arsonval galvanometer	10
III	Measurement of Power and Energy: Power measurement in three phase a.c. circuits using single phase and 3-phase watt meter, measurement of reactive power a.c. circuits using single phase and 3-phase wattmeter, measurement of reactive power (Single phase and 3-phase), Energy measurement using induction type meter, Power factor meters, frequency meter and synchroscope.	12
IV	Measurement of Resistance: Resistance classification, Measurement of Low resistance, Measurement of medium resistance, Measurement of high resistance, Meggar, Ohmmeter. Measurement of Inductance, Capacitance and Frequency using A.C. bridges.	19
V	Introduction to cathode ray tube, block Diagram of CRO. Measurement of voltage, current, phase & frequency using CRO, Dual Beam Oscilloscope,Dual Trace Oscilloscope	3
Total Number of Hours		**56**

Textbooks:

S. No	Name of Book	Author	Publisher
1	Electrical Measurements and Measuring Instruments	Golding, Widdis	Pitman
2	Electrical Electronic Measurements	A.K.Sawhney.	Dhanpat Rai

Course Code	**PCCEE405**			**Semester**	**FOURTH**
Category	**Professional Core Course**				
Course Title	**Digital Electronics**				
Scheme & Credits	**L**	**T**	**P**	**Credits**	**Max Marks: 100**
	3	**1**	**0**	**4**	
Prerequisites	**Nil**				

Course Objectives:

1. Understand the working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion

Unit	Topics	No. of Hours
I	Review of Number systems, Radix conversion Complements 9's & 10's, Subtraction using 1's & 2's complements. Binary codes, Error detecting and Correcting codes, Theorems of Boolean algebra, Canonical forms,	8
II	Logic gates and implementation of Boolean functions with various types of logic gates. Circuit equivalence. Simplification techniques and minimization by map methods. Tabular method.	15
III	Combination logic and arithmetic circuits. Encoders and Decoders, multiplexers & de-multiplexers.	5
IV	Sequential circuits –state diagrams and state tables, design and analysis of flip-flops, registers, counters. Synchronous and asynchronous operation of sequential circuits,Analog to digital convertor, digital to analog convertor.	7
V	Latches and memory organisation. ROM's, EPROM's and RAM's –Dynamic and static. Digital Logic Families: Introduction to bipolar Logic families: RTL, DCTL, DTL, TTL, ECL and MOS Logic families (NMOS, PMOS, CMOS), Details of TTL logic family- Totem pole, Open collector outputs, TTL subfamilies, Comparison of different logic families.	7
Total Number of Hours		**42**

Textbooks:

S. No	Name of Book	Author	Publisher
1	Digital logic	M. Moris Mano	Pearson
2	Digital principles and applications	A.P. Malvino	Tata Mcgraw hill
3	Switching circuits	Marcus	Prentice hall
4	Digital Electronics	Anil K. Maini	Wiley

Course Code	**PCCEE402L**			**Semester**	**FOURTH**
Category	**Professional Core Course**				
Course Title	**Electrical Machines-1 Lab**				
Scheme & Credits	**L**	**T**	**P**	**Credits**	**Max Marks: 100**
	0	**0**	**2**	**1**	
Prerequisites	**Nil**				

S. No.	**Experiment**
1	To perform open circuit and short circuit tests on a single-phase transformer
2	To perform polarity test on a single phase transformer
3	To determine the efficiency and voltage regulation of a single phase transformer
4	To study three phase connections on a bank of three single phase transformers
5	To study various parts of a dc machine and draw sketches of the same
6	To plot the saturation curve of a dc machine
7	To plot the external characteristics of a separately excited dc generator.
8	To study the voltage build-up of a dc shunt generator
9	To plot the external characteristic of a dc shunt generator.
10	To plot the external characteristics of a dc series generator.
11	To plot the external characteristic of a dc compound generator.

Course Code	**PCCEE403L**			**Semester**	**FOURTH**
Category	**Professional Core Course**				
Course Title	**Control System Lab**				
Scheme & Credits	**L**	**T**	**P**	**Credits**	**Max Marks: 100**
	0	**0**	**2**	**1**	
Prerequisites	**Nil**				

S. No.	**Experiment**
1	Use of MATLAB / SIMULINK /Control System tool boxes, neural & fuzzy toolboxes.
2	Analysis of Control Systems in MATLAB.
3	To study the computer simulation of a number of systems
4	To study the torque-speed characteristics of an AC servo motor.
5	To study the time response of a variety of simulated linear systems.
6	To study the role of feedback in a DC speed control system.
7	To study the role of feedback in a DC position control system.
8	To study the role of a combination of P,I and D control actions in a variety of simulated linear systems
9	System identification using frequency domain techniques
10	Lead/ lag compensator design
11	Computer control of systems
12	Control of stepper motor
13	Control system (State Space) study

Course Code	**PCCEE404L**			**Semester**	**FOURTH**
Category	**Professional Core Course**				
Course Title	**Electrical Measurement Lab**				
Scheme & Credits	**L**	**T**	**P**	**Credits**	**Max Marks: 100**
	0	**0**	**2**	**1**	
Prerequisites	**Nil**				

S. No.	**Experiment**
1	Measurement of power in single phase and three phase circuits using single phase and three phase wattmeters.
2	Energy Measurement using watt-hour meter as well as using wattmeter and stopwatch.
3	To study the constructional details of an electromechanical indicating instrument with the help of demonstration type of instrument
4	Measurement of Inductance and capacitance using Bridge techniques.
5	Measurement of Resistance by different methods.
6	To Study RC and LC models of a transmission line and observe the variation of voltage magnitude and phase along the line.
7	Measurement of Electrical and Non Electrical quantities using virtual instrumentation. (Dasylab)
7	Measurement using MATLAB/Simulink.

Course Code	**PCCEE405L**			**Semester**	**FOURTH**
Category	**Professional Core Course**				
Course Title	**Digital Electronics Lab**				
Scheme & Credits	**L**	**T**	**P**	**Credits**	**Max Marks: 100**
	0	**0**	**2**	**1**	
Prerequisites	**Nil**				

S. No.	Experiment
1	To verify the truth table of following logic gates: AND, OR and NOT NAND, NOR, XOR and XNOR
2	To realize the above gates using discrete active and passive components
3	To implement XOR and XNOR using universal logic gates
4	To verify DE Morgan's law using logic gates
5	To implement certain Boolean expressions and check their equality
6	To design and realize a) Half adder and verify its truth table. b) Full adder and verify its truth table. c) Half subtractor and verify its truth table. d) Full subtractor and verify its truth table
7	To design a multiplexer/ demultiplexer using two input NAND gates
8	To design a 4-bit binary to decimal convertor
9	To design a modulo 10 counter
10	Given the frequency f obtain the waveforms with frequencies f/2, f/5 & f/10
11	Design and realize the following flip-flops using logic gates. a) RS flip flop b) JK flip flop. c) D flip flop d) T flip flop.
12	Use PLL as a) Frequency multiplier, b) Frequency demodulator