

***Chhattisgarh Swami Vivekanand Technical University,
Bhilai***

SCHEME OF TEACHING AND EXAMINATION

B.E. III SEMESTER ELECTRICAL ENGINEERING

S.No.	Board of Studies	Subject Code	Subject	Periods per week			Scheme of Exam Theory/Practical			Total Marks	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1	Appl. Mathematics	324311 (14)	Mathematics III	4	1		80	20	20	120	5
2	Electrical Engg.	324312 (24)	Electrical Machines -I	3	2		80	20	20	120	4
3	Electrical Engg.	324313 (24)	Solid State Devices	3	1		80	20	20	120	4
4	Electrical Engg.	324314 (24)	Electric Circuits	3	1		80	20	20	120	4
5	Electrical Engg.	324315 (24)	Numerical Analysis & Computer Programming	3	1		80	20	20	120	4
6	Electrical Engg.	324316 (24)	Electrical Power Generation	3			80	20	20	120	3
7	Electrical Engg.	324321 (24)	Electrical Machines –I Lab			3	40		20	60	2
8	Electrical Engg.	324322 (24)	Solid State Devices Lab			3	40		20	60	2
9	Electrical Engg.	324323 (24)	Electric Circuits Lab			3	40		20	60	2
10	Electrical Engg.	324324 (24)	Computer Programming Lab			3	40		20	60	2
11	Humanities etc.	300325 (46)	Value Education			2			40	40	1
12			Library			1					
	Total			19	6	15	640	120	240	1000	33

**L – Lecture, T – Tutorial,
P – Practical, ESE- End Semester Exam, CT- Class Test
TA – Teacher’s Assessment**

Note : Duration of all theory papers will be of **Three Hours**.

**CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)**

Semester: **B.E. III Sem.**

Branch: **Electrical, Electrical & Electronics**

Subject : **MATHEMATICS-III**

Code : 324311 (14)

Total Theory Periods: **40**

Total Tutorial Periods: **10**

Total Marks in End Semester Exam. : **80**

Minimum number of class test to be conducted: **02**

UNIT - 1 FOURIER SERIES

(No. of periods 8+2)

Euler's Formula, Functions having points of discontinuity, Change of interval, Even & Odd functions, Half range series, Harmonic analysis.

UNIT - 2 LAPLACE TRANSFORM

(No. of periods 8+2)

Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by t , Division by t , Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

UNIT - 3 PARTIAL DIFFERENTIAL EQUATION

(No. of periods 8+2)

Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

UNIT - 4 COMPLEX VARIABLES

(No. of periods 8+2)

Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue, Evaluation of real definite integrals.

UNIT - 5 Z-TRANSFORM

(No. of periods 8+2)

Definition, Properties, Initial value & final value theorems, Inverse Z-transform, Convolution theorem, Partial fraction, Residue method & Applications to solution of difference equations.

TEXT BOOKS: -

1. Higher Engg. Mathematics by Dr. B.S. Grewal- Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons.

REFERENCE BOOKS: -

1. Advanced Engg. Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.
2. Applied Mathematics by P.N. Wartikar & J.N. Wartikar. Vol- II- Pune Vidyarthi Griha Prakashan, Pune.
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes - TMH.

**CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)**

Semester: B.E. III

Subject: Electrical Machines I

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of Class tests to be conducted: 2

Branch: Electrical

Code: 324312 (24)

Total Tut Periods: 12

UNIT – I

Review of transformer theory, Auto-transformer equivalent circuit and phasor diagram, three-phase transformers, core and shell type transformer, three-phase tank, three-phase unit, different connections and vector groups, three winding transformer connections, parameters of three winding transformer, coupled circuit view point.

UNIT – II

Parallel operation of single-phase and three-phase transformer, Scott connection, open-delta, back-to-back test, separation of losses, excitation phenomenon in transformers.

UNIT – III

Electromagnetic principle of DC machine, constructional details, production of voltage and torque, BLV and BLI concepts, classification of DC machine, conditions of self excitation, armature reaction and its effect, flux and mmf waves, effect of brush shift, commutation, methods of improving commutation, Operating characteristics of DC generator, parallel operation.

UNIT – IV

DC machine as motor, armature reaction, its effect on motor working, electrical and mechanical characteristics of DC motor, starting and speed control of DC motors, losses in DC machines, Testing of DC machines, Swinburne's test, regenerative and retardation test.

UNIT – V

Cross-field machines, armature winding, transformer cooling, wide band transformer, pulse transformer, audio frequency transformer.

Text Books:

1. Electrical Machines by Smarajit Ghosh, Pearson Education
2. Performance & Design of A.C. Machines by M.G. Say, C.B.S. Publishers

Reference Books:

1. Performance & Design of D.C. Machines by A.E. Clayton & Hancock, C.B.S. Pbs.
2. Electric Machines by Nagrath & Kothari, TMH Pbs.
3. Electric Machines by P.K. Mukherjee & S.Chakravarti, Dhanpat Rai
4. Electrical machines by B. R, Gupta, New age international.

**CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)**

Semester: B.E. III

Subject: Solid State Devices

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of Class tests to be conducted: 2

Branch: Electrical

Code: 324313 (24)

Total Tut Periods: 12

UNIT I

Semiconductors: Intrinsic and extrinsic semiconductors, P - type and N - Type semiconductors, Theory of P-N junction diode, formation of space charge region, Forward and reverse biasing of diodes, energy band diagram of a diode, V-I Characteristics of diodes, equivalent circuit of diode, junction capacitances of diode.

UNIT II

Rectifiers: Half wave and full wave bridge rectifier circuits, C filter, L filter, LC filter, CLC/II filter, various parameters of power supply, Zener diode and regulated power supply using Zener diodes.

UNIT III

Transistors: PNP and NPN transistors, construction and current components, transistor as an amplifier, CE, CB and CC amplifier circuit, input and output characteristics of transistor circuits, various parameters of transistor, DC load line, Biasing of transistor amplifier, biasing stability, transistor as a switch.

UNIT IV

Field Effect Transistor: Construction, principle of working and V-I characteristics. MOSFET: Construction, principle of working and V-I characteristics, Depletion and enhancement type MOSFET, CMOS, FET biasing, parameters of a FET.

UNIT V

Feedback amplifiers and oscillators: General feedback theory, current and voltage feedback, Effect of negative feedback, condition for oscillation, RC phase oscillator, Hartley and Colpitt's oscillator, Crystal oscillator, Tunnel Diode Oscillator.

Text Books:

1. "Integrated Electronics", Millman and Halkias, TMH Pbs.
2. "Electronic devices and circuits", Boylestad & Nashelsky, Pearson Pbs.

Reference Books:

1. "Microelectronic Circuits", Sedra Smith, Oxford Pbs.
2. "Electronic circuit analysis and design", Donald, TMH Pbs.
3. Electronics analog and digital, Nagrath PHI Pbs.

**CHHATISGARH SWAMI VIVEKANAND TECHNICAL
UNIVERSITY, BHILAI (C.G.)**

Semester: B.E. III

Subject: Electric Circuits

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of Class tests to be conducted: 2

Branch: Electrical

Code: 324314 (24)

Total Tut Periods: 12

UNIT – I

Development Of Circuit Concepts:

The relationship of field and circuit concept for parameters, lumped, linear and bilateral elements, voltage and current sources, duality of simple circuit, network topology: graph tree, branch link, tie set, cutset, loop and nodal analysis, equilibrium equations.

UNIT – II

Network Solution And Reduction:

Solution of network equation of determination method of network reductions, nodal analysis, mesh analysis, super node, super mesh network theorems, superposition theorem, reciprocity theorem, Thevenin's theorem, Norton's theorem, star delta transformation theorem, Tellegen's theorem.

UNIT – III

Network Solution And Reduction:

Electrostatic and electromagnetic coupling, self-inductance, mutual inductance, coupling coefficient, complete network with conductive and inductive coupling, Series and parallel resonance, quality factor, band width, selectivity, half power frequencies, circle diagram of simple series and parallel circuits, inversion of circle and straight line impedance and admittance loci.

UNIT – IV

Poly Phase Circuits:

Examples of two, three, four-loop circuits and their solutions, unbalanced poly phase circuits, determination of phase sequence, star/delta connections, and power measurement in poly phase circuits.

UNIT – V

Non – sinusoidal Ideal Wave Forms:

Common non-sinusoidal waveforms, Fourier series, analytical evaluation of Fourier coefficients, exponential form of Fourier series, frequency spectra of periodic waveforms, semi graphical method of analysis, effective value and equivalent power factor solution of circuits with non sinusoidal currents and voltages, harmonic resonance and harmonics in poly phase circuits.

Text Books: 1. “*Electric Circuit Analysis*”, Hayt, Kemmerly, Durbin, TMH Pbs.
2. “*AC Circuits*”, Kerchner and Cocoran
3. Network Analysis by M.E. Van Valkenberg

Reference Books: 1. “*Fundamentals of Electric Circuits*” Alexander & Sadiku, TMH Pbs.
2. “*Basic Circuit Theory*”, Desoer and Kuh, Mc Graw Hill Pbs.
3. Network Analysis & Synthesis, D. Roy Choudhary

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: B.E. III

Subject: Numerical Analysis & Computer Programming

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of Class tests to be conducted: 2

Branch: Electrical

Code: 324315(24)

Total Tut Periods: 12

UNIT-1: NUMERICAL ANALYSIS

Approximation and round of errors, Truncation errors and Taylor Series, Determination of roots of polynomials and transcendental equations by Newton's Raphson, Secant Baistows method, Solutions of linear simultaneous linear algebraic equations by Gauss Elimination and Gauss-Saturation methods.

UNIT-II

Curve fitting-linear and non-linear regression analysis. Backward, Forward and central difference relations and their uses in numerical differentiation integration application of difference relation in the solution of partial differential equations, Numerical solution of ordinary differential equitation by Euler, modification Euler, Runge –Kutta and Predictor –corrector Method.

UNIT-III: COMPUTER PROGRAMMING

Induction of computer programming in C and C++ languages, Arithmetic expressions, Simple programmes emphasis should be more on programming techniques rather than the language it self. The C Programming language is being chosen mainly because of the availability of the compilers, book and other reference materials.

Example of some simple C program, Dissection of the program line by line. Concepts of variable, program statements and function calls from the library (print for example) (Data type, print, char, float etc.)

UNIT-IV

C expressions, arithmetic operation relation and logic operations assignment statement, extension of assignment to the operations Primitive input output using get char[-] put char, exposure to the scan and print functions .C statements, conditional execution using if-else. Optionally switch and break statement may be mentioned. Concepts of loop, Example of loop in c using for-while and do-while optionally continue may be mentioned.

UNIT-V

One dimensional array and example of iterative programs using arrays, 2-d arrays, Use in matrix computations. Concepts of sub-Programming, functions, example of functions Argument passing mainly for the simple variable, Array of pointers, passing arrays as argument, String, C string library. Structure and unions Defining C Structure, passing Structure as arguments. Program examples, File I/O, use of open, scan and print routines.

Text Books:

1. Let-us C by Yashwant Kanetker
2. Programming in Ansi C by Balaguruswami, TMH
3. Numerical methods By B.S.Grewwal, Khanna pub.

Reference Books:

1. Numerical Methods for Scientific and Engineering computation By M.K. Jain, SRK Iyengar, and R.K. Jain, Wiely Eastern
2. Programming in C++ by Balaguruswami, TMH
3. C++ programming fundamentals, NIIT, PHI pbs.

**CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)**

Semester: B.E. III

Subject: Electrical Power Generation

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of Class tests to be conducted: 2

Branch: EE/EEE

Code: 324316 (24)

Total Tut Periods: 12

UNIT I:

Prediction of Load: Definition of connected load, maximum load, maximum demand, demand factor, load factor, diversity factor, plant capacity factor, plant utilization factor, load duration curve, mass curve.

Choice of Power station and units: Types of power station, choice of type of generation, choice of size of generator units and number of units.

UNIT II

Steam Power station: Main parts and working of a steam station, characteristics of steam turbines, characteristics of turbo alternators, steam station auxiliaries, steam station layout, super pressure steam stations.

UNIT III

Hydro power stations: Hydrology, hydrographs, flow duration curve, mass curve, types of dam, principle of working of a hydro electric plant, tidal power plant, power to be developed, types of turbine and their characteristics, characteristics of generators, power station structure and layout.

UNIT IV

(A) Nuclear power stations: main parts of nuclear power station principle of nuclear energy, main parts of reactor, types of power reactor, location of nuclear power plant, layout of power station, reactor control, nuclear waste disposal.

(B) MHD generation: history of MHD generation, principle of MHD generation, MHD cycles and working fluids, open cycle MHD system, closed cycle MHD system, advantage of MHD generation.

UNIT V

(A) New Energy Sources: Solar radiation, Solar energy collectors, Conversion of solar energy into electric energy, Solar hydrogen energy cycle, Wind mills, Tidal power generation schemes, Tidal barrage, Environmental aspects of new and old electric energy generation.

(B) Economic operation of power systems: Criteria for distribution of load between units of a plant and between plants, transmission loss as a function of plant generation, loss formula coefficients, brief aspects of load dispatching.

Text Books:

1. Generation of Electrical Energy by B.R. Gupta, S.Chand Pbs.
2. Car, T.H., Electric Power Station, Chappman & Hall

Reference Books:

1. Elements of Electric Power Station Design by M.V. Deshpande
2. A Course in Electrical Power by Soni Gupta Bhatnagar, Dhanpat Rai
3. A Course in Electrical Power by J.B.Gupta, Kataria Pbs.

**CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)**

Semester: B.E. III

Subject: Electrical Machines-I Lab

Total Practical Periods: 36

Total Marks in End Semester Exam: 40

Branch: Electrical

Practical Code: 324321 (24)

List of experiments to be performed(minimum 10 experiments)

1. Determination of efficiency and voltage regulation of a Single Phase Transformer.
2. Parallel Operation of two Single Phase Transformer.
3. Study of three phase transformer connections.
4. Open & short ckt. Test of 3-phase transformer.
5. Back to back test on two single-phase transformers.
6. Measurement of armature and field winding resistance of D. C. Machine.
7. To study the reversal of D. C. Shunt Motor.
8. To perform Load Test on D. C. Shunt Generator.
9. To perform Swinburne's Test on a D. C. Machine and find out efficiency at full load.
10. Speed control of a D. C. Shunt Motor by (a) Varying field current with armature voltage kept constant. (b) Varying armature voltage with field current kept constant.
11. To find Magnetization or Open Circuit Characteristics of a D. C. Machine.
12. Polarity Test on transformer.
13. To find ratio of series to shunt field turns of DC machine.
14. Electrical breaking of DC motor.
15. 3-phase to 2-phase conversion by Scott connection.

Apparatus Required: -

1. Single phase Transformer
2. Auto Transformer
3. Resistive Load
4. Ammeters, Voltmeters, Wattmeter
5. DPMCB, Tachometer,
6. Starter
7. DC shunt motor, DC generator
8. DC source
9. Field regulator, Rheostat

Reference book:

1. Electrical Machines, Bimbhra, Khanna Pbs.

**CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)**

Semester: B.E. III

Subject: Solid State Devices Lab

Total Practical Periods: 36

Total Marks in End Semester Exam: 40

Branch: Electrical

Practical Code: 324322 (24)

List of experiments to be performed (minimum 10 experiments)

1. To determine Zener Diode Characteristic & Zener as a Voltage Regulator.
2. To design and study a Half Wave Rectifier Circuit
3. To design and study a Full Wave Center Tapped Rectifier Circuit.
4. To design and study a Full Wave Bridge Rectifier Circuit
5. To design and study Different Filter Circuits.
6. To design and study Different Clipping Circuits.
7. To design and study Different Clamper Circuits.
8. To design and study Collector To Base Feedback Circuits.
9. To design and study A Wein Bridge Oscillator Circuits.
10. To design and study transistorized phase shift oscillator.T
11. To design and study the characteristics of p-n junction diode & calculate cutting voltage, reverse saturation voltage, reverse saturation current & dynamic & static resistance from it.
12. To plot drain current – voltage & drain current – gate bias characteristics of FET & measurement of I_{dss} & V_p .
13. To study the MOSFET characteristics.
14. To plot input & output characteristics of BJT in CC, CB, CE configuration.
15. To characterize the PN Junction Diode.

Apparatus Required

1. Diodes, Capacitors, Resistors
2. Dual power supply
3. Operational amplifiers
4. Bread Board
5. AC power supply
6. CRO
7. Battery
8. Ammeter
9. Function Generator

Reference Books:

1. Basic Electronics -A text Lab manual by Zbar, Malvino, Miller
2. Basic Electronics & Linear Circuits – NN Bhargava, DC Kulshertha, S.C. Gupta, TTTI Chandigarh

**CHHATISGAH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)**

Semester: B.E. III

Subject: ELECTRIC CIRCUITS LAB

Branch: Electrical

Code: 324323 (24)

Total practical periods: 36

Total Marks in end Semester Exam: 40

List of Experiments(minimum 10 experiments)

1. To verify Reciprocity theorem.
2. To verify Superposition theorem.
3. To verify Thevenin's theorem.
4. To verify Norton's theorem.
5. To verify Max. Power transfer theorem.
6. To study the charging and discharging of a capacitor through resistor.
7. To measure the voltage current, and resistance with the help of electronic multimeter.
8. To plot voltage vs resistance characteristics of Incandescent lamp.
9. To connect a tube light and study its min. operating voltage, current, power and power factor.
10. To verify the voltage and current relation in star and delta connected system.
11. To measure three phase power using Two-watt meter method.
12. To verify the effect of resistance and condenser connected in series in an a.c. circuit.
13. To verify the effect of resistance and condenser connected in parallel in an a.c. circuit.
14. To verify Kirchoff's law. (a) Kirchoff's current law.(b) Kirchoff's voltage law.
15. To verify effect of unbalanced load in star connection.

List of apparatus required:

1. Voltmeter, ammeter, Wattmeter
2. Power factor meter
3. Resistors
4. Capacitors
5. Lamp load
6. DC supply
7. Three-phase autotransformer
8. Multimeter

Reference books:

1. Experiments in basic electrical engineering, S.K.Bhattacharya.
2. Basic shop practical, Mehta & Gupta
3. Practical in electrical engineering, Dr. N.K.Jain

**CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)**

Semester: B.E. III

Subject: Computer Programming Lab

Total Practical Periods: 36

Total Marks in End Semester Exam: 40

Branch: Electrical

Practical Code: 324324 (24)

List of experiments (minimum 10 experiments)

1. Write a programme to perform addition, Subtraction, division, of two integers & two floating point no.
2. Write a programme to calculate the area of a circle, triangle, square, rectangle [the various sides are given].
3. Write a Programme to read name & age of student & display it on a screen.
4. Write a Programme to find the average of three marks of students & calculate the percentage.
5. Write a Programme to generate Fibonacci series and to generate prime no. From 0-1000.
6. Write a Programme to find the roots of a quadratic equation.
7. Write a Programme to reverse a no. of a string.
8. Write a Programme to find if the no. or string is a palindrome.
9. Write a Programme to find factorial value of a given no.
10. Write a Programme to find the sum of the first seven of the series.
11. Write a Programme to swap two no.
12. Write a Programme to sort the element of an array.
13. Write a Programme to convert lower case string to upper case & vice-verse.
14. Write a Programme to open & close a file to store students information like name, age etc.
15. Write a Programme to find the value of definite integral using trapezoidal rule, the inverse of 3 x 3 matrix.

Reference Books:

1. Programming in C++ by Balaguruswami, TMH.
2. Let us C, Kanetkar.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester : B.E. 3rd Sem.

Branch : Common to all Branches

Subject : **Value Education**

Code : 300325(46)

No. of Periods : 2 pds/week

Tutorial Periods : NIL

Total Marks in End Semester Exam. : NIL

Teacher's Assessment : 40 Mks

Minimum number of class test to be conducted : Two

Unit – I

?? **STUDY OF BASIC HUMAN OBJECTIVES** : Everlasting solution of prosperity, trust in self and others and coexistence for balance in nature. Need and importance of aforesaid basic human objectives and how to achieve these.

Unit – II

?? **CONCEPT AND UNDERSTANDING OF HUMAN HAPPINESS**

Meaning and concept of "happiness", incessant happiness, its relationship with guarantee of physical needs, comforts, physical and sensory pleasures with its transient nature, misery; The only method to minimize incessant happiness : gaining right understanding about oneself, one's body, one's relationship with other human beings, Nature and total existence.

Unit – III

?? **PROPER UNDERSTANDING** about the order in Nature and co-existence at various levels, such as, I and my body, family, society, Nature and existence.

?? **UNDERSTANDING THE SELF** : Understanding human reality – I and my body, present understanding of the self, physical needs, relation with others and with Nature, gaining proper understanding of the self, discrimination between 'I' and my 'body', characteristics and the needs of 'I', of my 'body' and 'body' & 'I'.

Unit – IV

?? **SYNERGATIC ORDER and COEXISTENCE among HUMANS, IN NATURE & IN EXISTENCE** :

- Conceptual understanding of natural relations and consequent values, of family and relation therein, of society and role of engineers therein, overall excellence' : concept, its universal parameters and total human behaviour
- Inanimate and consciousness aspects of Nature, Four distinct synergetic orders in Nature - Padaarth Awastha, Pran Awastha, Jiv Awastha and Gyan Awastha complementary supplementary evolutionary connection amongst above orders, identifying and implementing "Appropriate Technology".

- Synergetic order among interacting entities of Nature operating in all pervading changeless Shunya or Satta, Indivisible interconnectedness of Satta and Prakriti and its implications.

Unit – V

?? IMPLICATIONS OF PROPER UNDERSTANDING

- Awakening the common goal of all human beings,
- promotion and perseverance of synergetic order and co-existence at all levels leading to incessant happiness.
- Natural manifestation of universal human values and thereby incessant happiness
- Undivided Society and Universal Organised System
- Transition from synergetic disorder to synergetic order
- Evaluation of Understanding, work and behaviour.

REFERENCES

1. Jeevan Vidya Camp notes
2. An Introduction to Jeevan Vidya by Shri A. Nagaraj
