INDIAN CONSTITUTION

MC 801 PO

Instruction: 2 periods per week	*Duration of SEE: 3 hours*
CIE: 30 marks	*SEE: 70 marks*
Credits: 0	

Objectives:

1. To create awareness among students about the Indian Constitution.
2.To acquaint the working conditions of union, state, local levels, their powers and functions
3. To create consciousness in the students on democratic values and principles articulated in the constitution.
4.To expose the students on the relations between federal and provincial units.
5.To divulge the students about the statutory institutions.

Outcomes: Student will be able to:

1. Know the background of the present constitution of India
2.Understand the working of the union, state and local levels
3.Gain consciousness on the fundamental rights and duties
4.Be able to understand the functioning and distribution of financial resources between the centre and states
5.Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived   sections can be addressed to raise human dignity in a democratic way.

UNIT – I
Evolution of the Indian Constitution: 1909 Act, 1919 Act and 1935 Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution
UNIT – II
Union Government: Executive-President, Prime Minister, Council of Minister *State Government*: Executive: Governor, Chief Minister, Council of Minister *Local Government*: Panchayat Raj Institutions, Urban Government
UNIT – III
Rights and Duties: Fundamental Rights, Directive principles, Fundamental Duties
UNIT – IV
Relation between Federal and Provincial units: Union-State relations, Administrative, legislative and Financial, Inter State council, NITI Ayog, Finance Commission of India.
UNIT – V
Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women.

Suggested Readings:

1	Durga Das Basu, "*Introduction to the Constitution of India*", Lexis Nexis Butterworths Wadhwa Nagpur, 2008
	Subhash Kashyap, "*Our Parliament*", National Book Trust, India, 2004.

2	
3	Peu Ghosh, "*Indian Government and Politics*", Prentice Hall of India, New Delhi,2012.

ENGLISH

HS 101 EG

Instruction: 2 periods per week	*Duration of SEE: 3 hours*
CIE: 30 marks	*SEE: 70 marks*
Credits: 2	

Objectives:

1.Using authentic material for language learning
2.Exposing them to a variety of content-rich texts
3.Strengthening their grammar and vocabulary
4.Improving their reading and comprehension skills
5.Honing their writing skills
6.Encouraging them to think creatively and critically

Outcomes: Student will be able to:

1.Read, understand, and interpret a variety of written texts
2.Use appropriate vocabulary and correct grammar
3. Undertake guided and extended writing with confidence

UNIT – I

Reading: RK Narayan, "A Horse and Two Goats"*Vocabulary*: Word formation—Prefixes, Suffixes, Root Words *Grammar:* Articles, Prepositions, Determiners

UNIT – II

Reading: Rudyard Kipling, "If"
Vocabulary: Word formation—Compounding and Blending, Contractions
Grammar: Transitions, Connectives
Writing: Paragraph Writing

UNIT – III

Reading: Martin Luther King Jr., "I Have a dream"
Vocabulary: Synonyms, Antonyms, One Word Substitutes
Grammar: Voice
Writing: Letter Writing

UNIT – IV

Reading: Robert Frost, "Road Not Taken"
Vocabulary: Homophones, Homonyms, Homographs
Grammar: Narration (Direct-Indirect Speech)
Writing: Report Writing

UNIT – V

Reading: George Orwell, "The Sporting Spirit" (Excerpt)
Vocabulary: Inclusive Language, Euphemisms
Grammar: Tense
Writing: SOP

Suggested Readings:

1	Board of Editors," *Language and Life: A Skills Approach*", Orient Black Swan, 2018.
2	Sudharshana, NP and C Savitha," *English for Engineers*", Cambridge University Press, 2018
3	Kumar, Sanjay and Pushp Lata," *English Language and Communication Skills for Engineers*", Oxford University Press, 2018

PHYSICS

BS 202 PH

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 4

Objectives:

1. Aware of limits of classical free electron free theory and to apply band theory of solids
2.Acquire knowledge on various properties of semiconductors.
3. Grasp the intricacies in semiconductor-optical interaction

Outcomes: Student will be able to:

1.Distinguish materials based on band theory of solids.
2.Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors.
3.Appreciate use of optical absorption by semiconductors.

UNIT – I
Crystallography: Introduction, Types of crystal systems, Bravais lattices, Lattiee planes and Miller Indices (Cubic system), Inter planar spacing (Cubic system), Bragg's law, Powder diffraction method. *Crystal Defects*: Classification of point defects, Concentration of Schottky defects in metals and ionic crystals, Concentration of Frankel defects, Line defects, Screw and Edge dislocations, Burger's vector.
UNIT – II
Band Theory of Solids & Semiconductors: Classical free electron theory (qualitative), Kronig Penney model (qualitative treatment), Energy band formation in solids, Intrinsic and Extrinsic semiconductors, Concept of a hole, Carrier concentration and conductivity in intrinsic semiconductors, Formation of P-N junction diode and its I – V characteristics, Thermistor and its characteristics, Hall effect and its applications. *Dielectric Materials:* Dielectrics, Types of polarizations, Electronic, Ionic, Orientational and Space charge polarizations, Expression for Electronic polarizability, Frequency and temperature dependence of dielectric polarizations, Determination of dielectric constant by capacitance Bridge method, Ferro electricity, Barium titanate, Applications of Ferroelectrics.
UNIT – III
Wave Mechanics: Matter waves –de-Broglie wavelength, properties of wave function, Physical significance, Schrodinger time dependent and time in-dependent wave equation. Particle in a 1-D box. *Electromagnetic Theory*: Basic laws of electricity and magnetism, Maxwell's equations in integral and differential forms, Conduction and displacement current, Relation between D, E and P – Electromagnetic waves: Equation of plane wave in free space, Poynting theorem.
UNIT – IV
Magnetic Materials: Classification of magnetic materials: dia, para, ferro, antiferro and ferrimagnetic materials, Weiss molecular field theory of ferromagnetism, Magnetic domains, Hysteresis curve, soft and hard magnetic materials, Ferrites: Applications of ferrites. *Superconductivity:* Introduction, General properties of super conductors, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), Introduction to High T_c superconductors, Applications of superconductors
UNIT – V
Lasers: Characteristics of Lasers, spontaneous and stimulated emission of radiation, Einstein's Coefficients, population inversion, Ruby Laser, Helium Neon Laser, Semi-Conductor Laser and applications of lasers. *Fiber Optics:* Introduction, Propagation of light through an optical fiber, Acceptance angle, Numerical aperture (NA), Types of Optical fibers and Refractive index profiles, Fiber drawing

process (double Crucible Method), Losses in optical fibers, applications of optical fibers.

Suggested Readings:

1	B.K. Pandey and S. Chaturvedi," *Engineering Physics*", Cengage Learning, 2012
2	A.K. Bhandhopadhya, "*Nano Materials*", New Age International, 1st Edition, 2007
3	M.S. Avadhanulu and P.G. Kshirusagar," *Engineering Physics*", S. Chand & Co. 1st Edition,1992
4	C.M. Srivastava and C. Srinivasan , "*Science of Engineering Materials*", New Age International, 2001
5	R.K Gaur and S.L Gupta, "*Engineering Physics*", McGraw-Hill Education (India) Pvt Limited, 1992
6	Sanjay D Jain and Girish G Sahasrabudhe, "Engineering Physics", Orient Black swan Pvt Limited, 2016

MATHEMATICS-II

BS 203 MT

Instruction: 3+1 periods per week	*Duration of SEE: 3 hours*
CIE: 30 marks	*SEE: 70 marks*
Credits: 4	

Objectives:

1.To study matrix algebra and its use in solving system of linear equations and in solving eigen value problems
2. To provide an overview of ordinary differential equations
3. To study special functions like Legendre and Beta Gamma functions
4.To learn Laplace Transforms and its properties

Outcomes: Student will be able to:

1.Solve system of linear equations and eigen value problems
2.Solve certain first order and higher order differential equations
3.Solve basic problems of Beta Gamma and Legender's Function
4.Apply Laplace Transforms; solve ordinary Differential Equations by using it

UNIT – I
Matrices: Rank of a matrix, Echelon form, System of linear equations, Linearly dependence and independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigenvectors, Properties of eigen values, Cayley - Hamilton theorem, Quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic forms.

UNIT – II
Differential Equations of First Order: Exact differential equations, Integrating factors, Linear differential equations, Bernoulli's, Riccati's and Clairaut's differential equations, Orthogonal trajectories of a given family of curves.

UNIT – III
Differential Equations of Higher Orders: Solutions of second and higher order linear homogeneous equations with constants coefficients, Method of reduction of order for the linear homogeneous second order differential equations with variable coefficients, Solutions of non-homogeneous linear differential equations, Method of variation of parameters, solution of Euler-Cauchy equation.

UNIT – IV
Special Function: Gamma Functions, Beta Functions, Relation Between Beta and Gamma Function, Error Functions. Power Series Method, Lengender's Differential Equations and Legender's Polynomial $P_n(x)$, Rodrigue's Formula (without proof).

UNIT – V
Laplace Transforms: Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof). Solution of ordinary Differential Equations using Laplace Transforms.

Suggested Readings:

1	R.K. Jain & S.R.K. lyengar, "*Advanced Engineering Mathematics*", Narosa Publications, 4th Edition, 2014.
2	Erwin Kreyszig, "*Advanced Engineering Mathematics*", John Wiley, 9th Edition, 2012
3	Dr.B.S. Grewal*, "Higher Engineering Mathematics"*, Khanna Publications, 43rd Edition, 2014
4	B.V. Ramana, "*Higher Engineering Mathematics*", Tata Mc Graw Hill, 2008
5	N. Bali and M. Goyal," *A text book of Engineering Mathematics*", Laxmi Publications, 7th Edition, 2010
6	H.K. Dass, Er. Rajnish Varma, "*Higher Engineering Mathematics*", S. Chand and Company Ltd, 3rd Edition, 2008

BASIC ELECTRICAL ENGINEERING

ES 301 EE

Instruction: 3+1 periods per week   *Duration of SEE: 3 hours*
CIE: 30 marks   *SEE: 70 marks*
Credits: 4

Objectives:

1. To provide an understanding of basics in Electrical circuits.
2. To provide an overview of ordinary differential equations

Outcomes: Student will be able to:

1. To analyse Electrical circuits to compute and measure the parameters of Electrical Energy
2.To comprehend the working principles of Electrical DC Machines
3. To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed   in given application
4.To comprehend the working principles of electrical AC machines

UNIT – I
DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.
UNIT – II
AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.
UNIT – III
Transformers and 3-ph Induction Motors: Transformers: Electromagnetic induction, Faradays laws, statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency, Auto-transformer and three-phase transformer connections.   *Three Phase Induction motor:* Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications
UNIT – IV

Single-phase induction motor and DC Machines: Single-phase induction motor: Construction and
 principle of operation, Capacitor start & capacitor run motor, applications.
     DC Generators: Dynamically induced emf, Flemming's Right hand and Left hand rules,
 Construction and principle of operation of DC generator, EMF equation, Types of DC
 Generators, OCC characteristics, applications.
     DC Motors: principle of operation of DC Motor, Types of DC motors, applications

UNIT – V
Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Readings:

1	N. K. De, "*Basic Electrical Engineering*", Universities Press, 2015.
2	J.B. Gupta, "*Fundamentals of Electrical Engineering and Electronics*" S.K. Kataria & Sons Publications, 2002
3	J.B. Gupta, "*Utilization of Electric Power and Electric Traction*" S.K. Kataria & Sons Publications, 2010
4	Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "*Basic Electrical Engineering*" Tata McGraw Hill, Publications, 2009
5	Hughes, "*Electrical Technology*", 7th Edition, Addison Welsey Longman Inc., 1995

ENGLISH LAB

HS 151 EG

Instruction:2 periods per week   *Duration of SEE: 3 hours*
CIE: 25 marks   *SEE: 50 marks*
Credits: 1

Objectives:

1. Giving them sufficient practice in listening with comprehension
2. Providing them ample opportunities to improve their public speaking skills
3. Training them in the use of correct pronunciation, stress, and intonation
4. Sensitizing them to the use of verbal and non-verbal communication appropriate to the context
5. Encouraging them to learn the art of conversation to suit formal and informal situations
6.Preparing them to make formal presentations and face interviews

Outcomes: Student will be able to:

1.Listen, understand, and interpret formal and informal spoken language
2. Speak English with acceptable pronunciation, stress, and intonation
3.Present themselves with confidence in formal situations
4. Participate in individual and group activities with relative ease

List of Experiments:
1. Listening for Comprehension 2. Pronunciation, Intonation, Stress, and Rhythm 3. Conversation Skills 4. Introducing Oneself and Others 5. Asking for and Giving Information 6. Making Requests and Responding to them Appropriately 7. Giving Instructions and Responding to them Appropriately 8. Making Formal Announcements and Emceeing 9. Group Discussions 10. JAM 11. Role Play 12. Debate 13. Public Speaking Skills and Body Language 14. Interviews 15. Formal Presentations

Suggested Readings:

1	Board of Editors, "*Language and Life: A Skills Approach*", Orient Black Swan, 2018
2	T. Balasubramanian, "*Textbook of English Phonetics for Indian Students*", Macmillan publishers, 1981
3	CIEFL Exercises in Spoken English. Parts. I-III. Oxford University Press
4	Pillai, Radhakrishna G, "*Spoken English For You - Level II*", 8th Edition, Emerald Publishers, 2014
5	Sethi, J and PV Dhamija, "*A Course in Phonetics and Spoken English*", 2nd Edition, Prentice Hall India Learning Private Limited, 1999

PHYSICS LAB

BS 251 PH

Instruction:2 periods per week	*Duration of SEE: 3 hours*
CIE: 25 marks	*SEE: 50 marks*
Credits: 1	

Objectives:

1. Make precise measurements using basic physical principles and acquire skills to handle the instruments
2. Relates the theoretical Knowledge to the behavior of Practical Physical world
3.Analyse errors in the experimental data
4.Plot graphs between various physical parameters

Outcomes: Student will be able to:

1.Conduct experiments, take measurements independently
2. Write appropriate laboratory reports
3.Compute and compare the experimental results and draw relevant conclusions
4.Use the graphical representation of data and estimate results from graphs

List of Experiments:

1. To determine the Dielectric constant and Phase transition temperature of Lead Zirconium Titanate (PZT).
2. To draw the I - V Characteristics of P-N Junction diode and to evaluate the resistance.
3. To find the values of Electrical conductivity and energy gap of Ge crystal.
4. Determination of rigidity of modulus of Torsion pendulum.
5. Determination of carrier concentration, Mobility and Hall Coefficient of Ge crystal using Hall Effect Experiment.
6. To determine the constants of A, B and α using Thermistor characteristics.
7. To draw the curve between the magnetizing field and the intensity of magnetization of the specimen (soft iron rod) and to find out
   i) Coercivity ii) Retentivity and iii) Hysteresis loss.
8. To draw the I - V Characteristics of a solar cell and to calculate the
   i) Fill factor Efficiency and ii) Series resistance.
9. To Determine the Numerical Aperture (NA) of Optical fiber.
10. To determine the wave length of the given Laser source.

Note: Minimum eight experiments should be conducted in the semester

Suggested Readings:

1	N.K. De, "*Basic Electrical Engineering*", Universities Press, 2015
2	J.B. Gupta, "*Fundamentals of Electrical Engineering and Electronics*" S.K. Kataria & Sons Publications, 2002
3	J.B. Gupta, "*Utilization of Electric Power and Electric Traction*" S.K. Kataria & Sons Publications, 2010

BASIC ELECTRICAL ENGINEERING LAB

ES 354 EE

Instruction:2 periods per week	*Duration of SEE: 3 hours*
CIE: 25 marks	*SEE: 50 marks*
Credits: 1	

Objectives:

1. To impart the practical knowledge on testing of DC and AC Machines.
2. To learn the usage of common electrical measuring instruments

Outcomes: Student will be able to:

1.Get an exposure to common electrical components and their ratings
2. Analyse the performance of DC and AC Machines
3.Comprehend the usage of common electrical measuring instruments
4. Test the basic characteristics of transformers and electrical machines

List of Experiments:

Dem1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

Exp 1. Verification of KVL and KCL, superposition theorem (with DC excitation)

Exp 2 Verification of Thevinens and Nortons theorems (with DC excitation)

Exp 3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Power factor calculation

Exp 4. Transformers: Observation of the no-load current waveform on an oscilloscope (nonsinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).

Exp 5. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

Exp 6. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).

Exp 7. Measurement of phase voltage/current, line voltage/current and power in a balanced three-phase circuit connected in star and delta.

Dem2. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.

Exp 8. OCC characteristics of DC Generator

Exp 9. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections.

Exp 10. Power factor improvement of Induction Motor using static capacitors

Exp 11. Load Test of DC Motor

Note - 1:

(i) List of Experiments and Demonstrations suggested above are already available in the Laboratory of the electrical department. No need to purchase any extra equipment except Demonstration2 equipments

iii)	Procurement of Demonstration 2 equipments can be done during the course work of that semester. It can be included in the laboratory.

Suggested Readings:

1	J.B. Gupta, "*Fundamentals of Electrical Engineering and Electronics*" ,S.K. Kataria & Sons Publications, 2002.
2	J.B. Gupta, "*Utilization of Electric Power and Electric Traction*" S.K. Kataria & Sons Publications, 2010
3	Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "*Basic Electrical Engineering*", Tata McGraw Hill, Publications, 2009
4	Hughes, "*Electrical Technology*", 7th Edition, Addison Wesley Longman Inc., 1995

ENGINEERING GRAPHICS

ES 353 CE

Instruction:6 periods per week	*Duration of SEE: 3 hours*
CIE: 50 marks	*SEE: 50 marks*
Credits: 3	

Objectives:

1.To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and   sustainability
2. To prepare you to use the techniques, skills, modern engineering tools to use for Engineering practice.

Outcomes: Student will be able to:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards
4. Exposure to solid modelling
5. Exposure to computer-aided geometric design
6. Exposure to creating working drawings
7. Exposure to engineering communication

S.No	Description	Lectures	Drawing
1	Principles of Engineering Graphics and their significance, usage of drawing instruments	1	
2	Conic Sections – I, Construction of ellipse, parabola and hyperbola given focus and eccentricity.	1	2
3	Conic Sections – II, Construction of ellipse (given major and minor axis), parabola (given bas and height), rectangular hyperbola	-	2
4	Cycloids (cycloid & epicycloid)	1	2
5	Involutes (involute of triangle, square & circle)	-	2
6	Scales (plain & diagonal scales)	1	2+2
7	Introduction to AutoCAD –Basic commands and simple drawings	-	2+2
8	Orthographic Projection , Projection of points situated in different quadrants	1	2
9	Projections of straight lines-I Lines parallel to both the reference planes, lines perpendicular or inclined to one reference plane	1	2
10	Projections of straight lines-II Lines parallel to both the reference planes	1	2
11	Projections of planes-I Perpendicular planes	1	2
12	Projections of planes-II Oblique planes	-	2
13	Projections of solids – I Polyhydra and solids revolution, projections of solids in simple position	1	2
14	Projections of solids – II Polyhydra and solids when the axes inclined to one or both the reference planes.	1	2

15	Section of solids – I When the sectional plane is parallel or perpendicular to one reference plane	1	2
16	Section of solids – II When the sectional plane is inclined to one reference plane	-	2
17	Development of surfaces – I Prisms and Cylinders	1	2
18	Development of surfaces – II Pyramids and Cones	-	2
19	Intersection of surfaces – I Intersection of cylinder and cylinder	1	2
20	Intersection of surfaces – I Intersection of cylinder and cones	-	2
21	Isometric projection – I- planes and simple solids	1	2
22	Isometric projection – I – Combination of two or three solids	-	2
23	Conversion of Isometric Views to Orthographic Views	1	2
24	Floor plans of 2 or 3 rooms including windows, doors, and fixtures such as WC, bath, sink, shower, etc.	1	2

Suggested Readings:

1	Bhatt N.D., Panchal V.M. & Ingle P.R.,"*Engineering Drawing"*, Charotar Publishing House, 2014
2	Shah, M.B. & Rana B.C., " *Engineering Drawing and Computer Graphics"*, Pearson Education, 2008
3	S.N Lal, " *Engineering Drawing with Introduction to Auto CAD"*, Cengage Learning India Pvt Ltd, New Delhi, 2018
4	Agarwar B. & Agrawal C. M., "*Engineering Graphics*", TMH Publication, 2012
5	Narayana, K.L. & P Kannaiah," *Text book on Engineering Drawing*", Scitech Publishers, 2008
6	(Corresponding set of) CAD Software Theory and User Manuals

NOTE:

1. At least 20 sheets must be covered.
2. Sheet number 1 to 6 (Graph sheets / drawing sheets)
3. Sheet number 7 to 24 (AutoCAD drawings.