

CURRICULUM

For

UNDERGRADUATE DEGREE COURSE IN

BASIC SCIENCES

B.Sc. (PSM)

(Second Year)



IIMT UNIVERSITY
MEERUT

[Proposed from 2018-19]

IIMT University, Meerut

FIRST YEAR, SEMESTER-III

STUDY & EVALUATION SCHEME

S. No	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BSM-301	Abstract Algebra	4	1	-	4	30	70	100
2	BSM-302	Vector Calculus, Geometry and Trigonometry	3	-	-	3	25	50	75
3	BSP-301	Electrostatics	4	1	-	4	30	70	100
4	BSP-302	Mechanics and wave motion	3	-	-	3	25	50	75
5	BSS-301	Probability distributions and Theory of Attributes	4	1	-	4	30	70	100
6	BSS-302	Mathematical Numerical Analysis	3	-	-	3	25	50	75
7	BSP-333	Electricity and Magnetism Lab	-	-	2	2	20	30	50
8	BSS-333	Statistical lab-III	-	-	2	2	20	30	50
9	ECC-321/322/323/324	Skill Enhancement Course			2	4	-	100	100
		TOTAL	21	3	6	29	205	520	725

SECOND YEAR, SEMESTER-IV

STUDY & EVALUATION SCHEME

S. No	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	BSM-401	Real Analysis	4	1	-	4	30	70	100
2	BSM-402	Matrix and Linear Algebra	3	-	-	3	25	50	75
3	BSP-401	Electronics	4	1	-	4	30	70	100
4	BSP-402	Electromagnetic Theory	3	-	-	3	25	50	75
5	BSS-401	Applied Statistics	4	1	-	4	30	70	100
6	BSS-402	Statistical Techniques for Research Methods	3	-	-	3	25	50	75
7	BSP-444	Electronics Devices & Circuit Theory Lab	-	-	2	2	20	30	50
8	BSS-444	Statistical lab-IV	-	-	2	2	20	30	50
9	ECC- 421/422/423/424	Skill Enhancement Course			4	-	100	-	100
		TOTAL	21	3	8	25	305	420	725

SEMESTER-III

[L= Lecture, T = Tutorials, P = Practicals& C = Credits]

BSM-301	Abstract Algebra	4L:1T:0P	4Credits
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UNIT-1**(09 Lectures)**

Algebraic Structures, Definition and examples of groups, elementary properties of groups, permutation groups. Subgroups and examples of subgroups, centralizer, normalizer, center of a group, Product of two subgroups.

UNIT-2**(09 Lectures)**

Properties of cyclic groups, classification of subgroups of cyclic groups. Cycle notation for permutations, properties of permutations, even and odd permutations,

UNIT-3**(09 Lectures)**

Alternating group, properties of cosets, Lagrange's theorem and consequences External direct product of a finite number of groups, normal subgroups, factor groups, Cauchy's theorem for finite Abelian groups.

UNIT-4**(09 Lectures)**

Group homomorphism, properties of homomorphism, Cayley's theorem, properties of isomorphism, First, Second and Third isomorphism theorems

UNIT-5**(09 Lectures)**

Introduction to rings, subrings, integral domains and fields, Characteristic of a ring, Homomorphism of rings, Ideals, Quotient rings.

Books Recommended

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
3. Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.
4. George E Andrews, Number Theory, Hindustan Publishing Corporation, 1984.

BSM-302	Vector Calculus, Geometry and Trigonometry	3L:0T:0P	3 Credits
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UNIT-1**(09 Lectures)**

Vector differentiation: Introduction of Vector and Scalar quantities, Vector point function. Gradient, divergence and curl of a vector point function and their physical interpretation.

UNIT-2**(09 Lectures)**

Vector integration: Line, surface and volume integrals, Theorems of Gauss, Green and Stokes theorems and based problems.

UNIT-3**(09 Lectures)**

General equation of second degree, Tracing of conics, System of conics, Confocal Conics, Polar equation of a conic and its properties, Three dimensional system of co-ordinates, Projection and direction cosines, Plane, Straight line. Sphere, cone and cylinder

UNIT-4**(09 Lectures)**

Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.

Books Recommended:

1. G. B. Thomas and R. L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
2. H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons (Asia) P. Ltd. 2002.
3. P. C. Mathew's, Vector Calculus, Springer Verlag London Limited, 1998.
4. Vector Analysis by M.R. Spiegel, Schaum's outline series.

BSP-301	Electrostatics	4L:1T:0P	4 Credits
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UNIT-I(09Lectures)

Electric Field: Electric Field and Lines, Electric Flux, Gauss's law, Gauss's law in Differential form. Applications of Gauss's Law: E due to (1) an Infinite Line of Charge, (2) a Charged Cylindrical Conductor, (3) an Infinite Sheet of Charge and Two Parallel Charged Sheets, (4) a Charged Spherical Shell, (5)

UNIT-II(09Lectures)

A Charged Conducting Sphere, (6) a Uniformly Charged Sphere, (7) Two Charged Concentric Spherical Shells and (8) a Charged Conductor. Force on the Surface of a Charged Conductor and Electrostatic Energy in the Medium surrounding a Charged Conductor.

UNIT-III(09Lectures)

Electric Potential: Line Integral of Electric Field, Electric Potential Difference and Electric Potential V (Line integral), Conservative Nature of Electrostatic Field, Relation between E and V, Electrostatic Potential Energy of a System of Charges. Potential and Electric Field of (1) a Dipole,

(2) a Charged Wire (3) a Charged Disc, Force and Torque on a Dipole, Electrostatic Energy of (1) a Point Charge, (2) a System of Point Charges, (3) a Uniform Sphere, (4) a Capacitor.

UNIT-IV(09Lectures)

Dielectrics: Electric Field in Matter, Dielectric Constant, Parallel Plate Capacitor with a Dielectric, Polarization, Polarization Charges and Polarization Vector, Electric Susceptibility, Gauss's law in Dielectrics, Displacement vector D, Relations between the three Electric Vectors. Capacitors filled with Dielectrics.

UNIT-V(09Lectures)

Electric Circuits: AC Circuits containing R, L, C, Complex Reactance and Impedance, Phasor diagram for current and voltage in AC circuits, Analysis of AC using operator Series LCR Circuit: Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width Parallel LCR Circuit.

Text and Reference Books

1. Electricity and Magnetism by Edward M. Purcell (McGraw-Hill Education, 1986).
2. Fundamentals of Electricity and Magnetism By Arthur F. Kip (McGraw-Hill, 1968).
3. Electricity and Magnetism by J.H. Fewkes & John Yarwood. Vol. I (Oxford Univ. Press, 1991).
4. Electricity and Magnetism. By D C Tayal (Himalaya Publishing House, 1988).
5. David J. Griffiths, Introduction to Electrodynamics, 3rd Edn, (Benjamin Cummings, 1998).

BSP-302	Mechanics and wave motion	3L:0T:0P	3 Credits
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UNIT-I(09Lectures)

Conservation of Energy, Conservative forces, Internal forces and conservation of linear momentum, Centre of mass, systems with variable mass, Space-Vehicle Problem, Conservation of Angular Momentum, Internal torques, Angular Momentum about the Centre of mass, Rotational invariance.

UNIT-II(09Lectures)

Equation of motion, angular momentum and kinetic energy of a Rotating Body, Moment of Inertia and Radius of Gyration, Rotation of about fixed axes – time dependence of motion, cylinder on an accelerated rough plane, Behaviour of angular momentum vector, Principal axes and Euler's equations. Elementary Gyroscope, Symmetrical Top.

UNIT-III(09Lectures)

Force between a Point Mass and Spherical shell, Force between a Point Mass and Solid Sphere, Gravitational and Electrostatic self-energy. Gravitational energy of the Galaxy and of uniform sphere; Orbits and their eccentricity, two body problem - reduced mass.

UNIT-VI(09Lectures)

Simple harmonic motion, differential equation of S. H. M. and its solution, uses of complex notation, damped and forced vibrations, composition of simple harmonic motion.

Text and Reference Books

1. Mathematical Methods for Physics and Engineering: K.F. Riley, M.P. Hobson and S.J.Bence (Cambridge University Press),1998.
2. Mechanics (Berkeley) Physics Course I: Charles Kittel, Walter D. Knight, M. Alvin and A.Ruderman (Tata McGraw Hill),1981.
3. Mechanics: H.S. Hans and S.P. Puri (Tata McGraw Hill),2003.
4. Introduction to Classical Mechanics: R.G. Takwale&P.S.Puranik (Tata-McGraw-Hill), 2000.

BSS-301	Probability distributions and Theory of Attributes	4L:1T:0P	4 Credits
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UNIT-1**(09 Lectures)**

Discrete univariate distributions: Uniform, Binomial, Poisson, Hyper-geometric, Geometric and Negative binomial distributions.

UNIT-2**(09 Lectures)**

Continuous univariate distributions: Uniform, Normal, Exponential, Gamma, Beta and Cauchy distributions.

UNIT-3**(09 Lectures)**

Exact sampling distributions: chi-square, t and F with distribution function and their simple properties.

UNIT-4**(09 Lectures)**

Theory of attributes: Notion and terminology, Contingency table, class frequencies, ultimate class frequencies, consistency. Association of attributes, independence, measure of association for 2x2 table, Yule's coefficient of association. Contingency tables.

UNIT-5**(09 Lectures)**

Fitting of binomial and poisson distributions, fitting of normal distribution.

Books Recommended

1. Goon, Gupta and Dasgupta : Fundamentals of Statistics, Vol I. The Worlds Press Pvt. Ltd., Calcutta.
2. Yule, G.U. and Kendall, M.G.: An Introduction to the theory of statistics. Charles Griffin & Company Ltd.
3. Gupta, S.C. and Kapoor, V.K. 1 Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
4. Parzen, E.S. : Modern Probability Theory and Its Applications.
5. Meyer, P.: Introductory Probability and Statistical Applications.
6. Mood A.M., Graybill F.A. and Boes D.C. (1974) : Introduction to the theory of Statistics, McGraw Hill.

BSS-302	Mathematical Numerical Analysis	3L:0T:0P	3 Credits
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UNIT-1 (09 Lectures)

Finite Differences: - Difference Table , Operators E & Δ , Factorial Notation. Newton Formula for equal intervals. Newton's forward and backward divided difference.

UNIT-2 (09 Lectures)

Interpolation and Extrapolation: - Lagrange's divided difference interpolation formula for unequal intervals, Gauss interpolation formula, Sterling Formula, Bessels's formula.

UNIT-3 (09 Lectures)

Numerical integration: - Trapezoidal rule, Simpson's one-third rule, three-eighth rule, Weddle's rule with error terms. Solution of difference equations of first order.

UNIT-4 (09 Lectures)

Game Theory: - Introduction, two person zero sum game, saddle point, graphical method of solution of game, principle of dominance.

Books Recommended:

1. Malik S.C. and SavitaArora: Mathematical Analysis, Second Edition, Wiley Eastern Limited, New Age International Limited, New Delhi, 1994.
2. Somasundram D. and Chaudhary B.: A First Course in Mathematical Analysis, Narosa Publishing House, New Delhi, 1987.

BSP-333	ElectricityandMagnetismLab	0L:0T:2P	2 Credits
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Note: Select any ten experiments from the following list.

1. A Determine the resistance of a galvanometer using post office box by Kelvin's method.
2. To calibrate the given voltmeter and ammeter by low resistance potentiometer.
3. To determine the hysteresis loss of ferromagnetic materials.
4. To determine a Low Resistance by Carey Foster's Bridge.
5. To determine High Resistance by Leakage of a Capacitor.
6. To determine the (a) Charge Sensitivity and (b) Current Sensitivity of a B.G.
7. To determine the Ratio of Two Capacitances by de Sauty's Bridge.
8. To determine Self Inductance of a Coil by Anderson's Bridge using AC.
9. To determine Self Inductance of a Coil by Rayleigh's Method.
10. To determine the Mutual Inductance of Two Coils by Absolute method using a B.G.
11. To study the response curve of a Series LCR circuit and determine its (a) Resonant Frequency, (b) Impedance at Resonance and (c) Quality Factor Q, and (d) BandWidth.

BSS-333	Statistical lab-III	0L:0T:2P	2 Credits
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Note: Select any ten experiments from the following list.

1. Formation of difference table, fitting of polynomial and missing terms for equal interval of differencing.
2. Based on Newton's Gregory forward difference interpolation formula.
3. Based on Newton's backward difference interpolation formula.
4. Based on Newton's divided difference and Lagrange's interpolation formula.
5. Based on Gauss forward, Gauss backward central difference interpolation formula.
6. Based on Sterling's central difference interpolation formula.
7. Based on Lagrange's Inverse interpolation formula. .
8. Based on Trapezoidal Rule, Simpson's one-third rule, Simpson's three-eighth rule, Weddle's rule.
9. Find the solution of the game by graphical method.
10. Find the solution the game by principle of dominance.
12. Fitting of Binomial distributions to for n and $p=q=1/2$.
13. Fitting of Binomial distributions for given n and p.
14. Fitting of Binomial distributions after computing mean and variance.
15. Fitting of Poisson distributions for given value of lambda.
16. Fitting of Poisson distributions after computing mean.
17. Fitting of Negative Binomial distributions.
18. Application problems based on Binomial distributions.
19. Application problems based on Poisson distributions.
20. Application problems based on Negative Binomial distributions.
21. Fitting of Normal distributions to observed data
22. Fitting of Normal distributions for known mean and variance.
23. Problems based on area property of Normal distributions

Skill Enhancement Course

Once upon a time, people thought it was possible to qualify for a job and then just do that job forever without having to learn more. This was probably never really true...but it is DEFINITELY NOT true now! The technical skills and knowledge needed for work are changing all the time now and everyone need to be learning throughout their careers to stay relevant and competitive.

Learning is skills enhancement – and skills enhancement will help you to get employed and stay employed. Skills Enhancement is all about getting the skills you need to succeed in the work you want to do. Some jobs require specific technical skills and specific education, accreditation or licensing – you will need to know what is required for kind of work you want.

At IIMTU the student will go through the following Skill Enhancement course structure,

S. No.	Course Name	Course Code	Max. marks
1.	Industrial Visits/ Seminars or Presentation on The Reports of The Visits.	ECC-111	25
2.	University Social Responsibility(USR)	ECC-112	25
3.	Spoken Tutorial Certification	ECC-113	25
4.	MOOCS(Swayam)	ECC-114	25

1. Industrial Visits/ Seminars or Presentation on the reports of the visits;

In this section the presentation skills on the basis of observation and learning will be developed and evaluated. Student will be expected to give presentation in the department interpreting the report of his/her industrial visit organized by his department during semester. Participation in the seminars organized in the department will also be considered and evaluated in this section.

2. University Social Responsibility(USR);

Social responsibility describes the way we are making a difference to the social and economic well-being of our communities through our teaching, research, and public events and activities.

We strive to make a positive difference to the life and future of our region by taking socially responsible decisions that have real, beneficial, measurable impacts on the people and the world around us.

The aim of USR should be;

- Increasing the university's impact within society and contributing to tackling societal challenges increasing public understanding of the university's research
- Increasing cooperation with industry or public bodies
- Increasing the impact of university research on the social and cultural life of the local
- Community promoting university participation in policy-making
- Potential helping to align the university with trends in policy and funding

To meet the mentioned challenges a variety of activities can be carried out. Some of the points are listed below.

- Collaboration with companies, public services or NGOs in social projects to help the disadvantaged
- Sensitizing, educational campaigns on social responsibility in areas of influence which are close to the university
- Collaboration with public services and NGOs in sustainable initiatives
- Sensitizing educational campaigns on environmental protection in areas of influence which are close to the university
- Organization and sponsoring of performances committed to both local and regional socioeconomic development
- Organization of volunteering programs for students, professors and staff
- Scientific research on social problems and the knowledge generation
- Application of scientific knowledge to the development of new environment-friendly products, technologies and processes
- Integrating values such as respecting individual and social
- Education in environmental values
- University awareness of environmental problems and Vocational training to solve environmental problems

In this section the performance of the student will be evaluated on the basis of his/her participation and work carried out towards USR.

3. Spoken Tutorial Certification;

Salient features of the Spoken Tutorial project are

- Spoken Tutorial is a 10 minute audio-video tutorial on IT topics.
- The objective of the Spoken Tutorial project is to improve the employment potential of our students by teaching them IT skills

- The Spoken Tutorial project is funded by the National Mission on Education through ICT, MHRD.
- There are about 630 original spoken tutorials, created in English
- Spoken Tutorials cover many useful IT topics, such as Basic IT Literacy, Tux Typing, KTurtle, C, C++, Java, PHP, Linux, Scilab, Python, OpenFOAM, PERL, Ruby, LibreOffice, Blender, GeoGebra, Jmol, GChemPaint and Inkscape.
- These videos are dubbed into all 22 Indian languages. In each of the following languages, we have more than 100 tutorials: Assamese, Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Nepali, Punjabi, Sanskrit, Tamil, Telugu and urdu. Including the dubbed tutorials, there is a total of 4200 videos.
- Spoken Tutorials are created for self learning - achieved through novice check of the script.
- The usage of language dubbed Spoken Tutorials is increasing, with the large scale acceptance of this method by ITIs, who entered our fold about six months ago. We have already trained more than 4,00,000 ITI students through this methodology. The local language use is expected to increase further when the Government Schools start using this methodology.

4. MOOCS (Massive Open Online courses);

A massive open online course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials such as filmed lectures, readings, and problem sets, many MOOCs provide interactive courses with user forums to support community interactions among students, professors, and teaching assistants (TAs) as well as immediate feedback to quick quizzes and assignments.

The certification courses recommended are tabulated below;

PHP, My SQL / Perl	Engg. (Degree & Diploma) (CS & IT), BCA, MCA, B.Sc. (CS)
C/C++, Java, Netbeans & Python	CS / IT - Engg., BCA, MCA, B.Sc. (CS)
Linux	Diploma - CS / IT, BCA, B.Sc (CS)
Science Lab. & OSCAD (Free EDA)	B.Tech. & Poly. (EC, EE, CE, ME)
Latex & Firefox	B.Ed & BTC B.Sc. Nursing B.Sc. Home Science B.Sc. (All Streams) B.Com.
GIMP, Q - CAD	B.Arch. / BFT (Proposed (2018-2019))
Cell Designer	B.Sc. Biotech. B.Sc. Microbiology

G. Chem. Paint & J Mol app	B.Sc. Chem. B. Pharma M. Pharma M.Sc. Chem.
Inks cape & Blender	BJMC
Java Business app.	Librarians
Math	B.Sc. (Maths)

SEMESTER-IV

[L= Lecture, T = Tutorials, P = Practicals & C = Credits]

BSM-401	Real Analysis	4L:1T:0P	4 Credits
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UNIT-1**(09 Lectures)**

Axiomatic study of real numbers, Completeness property in Real numbers, Archimedean property, Countable and uncountable sets, Neighborhood, Interior points, Limit points, Open and closed sets, Derived sets, dense sets, Perfect sets, Bolzano-Weierstrass theorem.

UNIT-2**(09 Lectures)**

Sequences of real numbers, Subsequences, Bounded and monotonic sequences, Convergent sequences, Cauchy's theorems on limit, Cauchy sequence, Cauchy's general principle of convergence, Uniform convergence of sequences and series of functions, Weierstrass M-test, Abel's and Dirichlet's tests.

UNIT-3**(09 Lectures)**

Sequential continuity, Boundedness and intermediate value properties of continuous functions, Uniform continuity, Meaning of sign of derivative, Darboux theorem.

UNIT-4**(09 Lectures)**

Riemann integral, Integrability of continuous and monotonic functions, Fundamental theorem of integral calculus, Mean value theorems of integral calculus, Improper integrals and their convergence, Comparison test, μ -test, Abel's test, Dirichlet's test, Integral as a function of a parameter and its differentiability and integrability.

UNIT-5**(09 Lectures)**

Definition and examples of metric spaces, Neighborhoods, Interior points, Limit points, Open and closed sets, Subspaces, Convergent and Cauchy sequences, Completeness, Cantor's intersection theorem.

Books Recommended

1. T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2. R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000.
3. K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.

BSM-402	Matrix and Linear Algebra	3L:0T:0P	3 Credits
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Unit 1**(09 Lectures)**

Symmetric and skew-symmetric matrices, Hermitian and skew-Hermitian matrices, Orthogonal and unitary matrices, Triangular and diagonal matrices, Rank of a matrix, Elementary transformations, Echelon and normal forms, Inverse of a matrix by elementary transformations.

Unit 2**(09 Lectures)**

Characteristic equation, Eigen values and Eigen vectors of a matrix, Cayley-Hamilton's theorem and its use in finding inverse of a matrix, Application of matrices to solve a system of linear (both homogeneous and non-homogeneous) equations, Consistency and general solution, Diagonalization of square matrices with distinct eigen values.

Linear Algebra**Unit 3****(09 Lectures)**

Vector spaces and their elementary properties, Subspaces, Linear dependence and independence, Basis and dimension, Direct sum, Quotient space.

Unit 4**(09 Lectures)**

Linear transformations and their algebra, Range and null space, Rank and nullity, Matrix representation of linear transformations, Change of basis. Linear functional, Dual space, Bi-dual space, Natural isomorphism, Annihilators, Bilinear and quadratic forms.

Books Recommended

1. A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984.
2. S. H. Friedberg, A. L. Insel and L. E. Spence, Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
3. Richard Bronson, Theory and Problems of Matrix Operations, Tata McGraw Hill, 1989.
4. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Ed., Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
5. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
6. S. Lang, Introduction to Linear Algebra, 2nd Ed., Springer, 2005.
7. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.

BSP-401	Electronics	4L:1T:0P	4 Credits
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UNIT – 1**(09Lectures)**

Solid-State devices and their associated circuits: Introduction of Semiconductor and type of semiconductor, P type and N type semiconductor, p-n junction diode, Half-wave rectifier circuits, Full wave rectifier circuits, Voltage Multiplier circuits, Zener diode, Photo-diode, Light emitting diode, and Solar cell. The bi-polar transistor, Base bias, Voltage divider bias, Emitter bias, Collector feedback bias, Thermal runaway and Heat Sink.

UNIT – 2**(09Lectures)**

Amplifier: Concept of amplifier, the common-base amplifier relation between input and output phase voltages, Gain in common base amplifier, Common-emitter amplifier, Relation between input and output phase voltages, Gain in common emitter Amplifier, Transistor as an Oscillator.

UNIT – 3**(09Lectures)**

Operational Amplifiers: Introduction, Block diagram of a OP-AMP Schematic Symbol, Ideal OP-Amp with feedback equivalent circuit of an Op-Amp, Inverting Amplifier, Non-Inverting Amplifier, The voltage follower, The summing Amplifier, Subtracting Amplifier, Differential Amplifier, Integrator, differentiator.

UNIT – 4**(09Lectures)**

Digital Electronics: Introduction, Analog and Digital Signals, Binary Number System, Counting in Decimal and Binary Systems, Place value Decimal to Binary conversion, Binary to Decimal conversion, Binary addition, Subtraction Multiplication, Hexadecimal Number System, Logic Gates, with Boolean expression, Combination of Basic Logic Gates, Universal Gate, Encoders and Decoders, Boolean Algebra and Boolean Theorems, De Morgan's Theorems, Octal Number System.

UNIT – 5**(09Lectures)**

Electronic Instruments and communication systems: Introduction, Voltmeters, Digital Voltmeters, Digital Multimeters, Applications of Multimeter, Cathode Ray Oscilloscope, Application of CRO, Principles of Communication, Transmitter, Receiver Satellite Communication (Introductory) (10).

Text and Reference Books

1. Principle of electronics by VK Mehto (S. Chand).
2. OP-AMPS and Linear inteoxated circuit by pub PHI.
3. Electronics by Gupta & Kumar (Gayakwad Praoati Prakashan).
4. Transistor Physics and Circuit Design by DC Sarkar, S Chand & Co (P) Ltd.
5. Electronic Devices and Circuit Theory by Robert Boylestad, Lovis Nashelsky, pub : (PHI).

BSP-402	Electromagnetic Theory	3L:0T:0P	3 Credits
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UNIT – I**(09Lectures)**

Maxwell's Equations: Maxwell Equations, Displacement Current, Vector and Scalar Potentials, Gauge Transformations: Lorentz and Coulomb Gauge, Boundary Conditions at Interface between Different Media, Wave Equations, Plane Waves in Dielectric Media, Poynting Theorem and Poynting Vector, Electromagnetic Energy Density, Physical Concept of Electromagnetic Field.

UNIT – II**(09Lectures)**

Reflection and Refraction of Electromagnetic Waves: Reflection and Refraction of a Plane Wave at a Plane Interface between Dielectrics, Fresnel Formulae, Total Internal Reflection, Brewster's Angle, Waves in Conducting Media, Metallic Reflection (Normal Incidence), Skin Depth, Maxwell's Equations in Microscopic Media (Plasma), Characteristic Plasma Frequency, Refractive Index, Conductivity of an Ionized Gas, Propagation of e.m. Waves in Ionosphere.

UNIT – III**(09Lectures)**

Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization, Double Refraction, Polarization by Double Refraction, Nicol Prism, Ordinary and Extraordinary Refractive Indices, Production and Detection of Plane, Circularly and Elliptically Polarized Light, Phase Retardation Plates: Quarter-Wave and Half-Wave Plates.

UNIT – IV**(09Lectures)**

Rotatory Polarization: Optical Rotation, Biot's Laws for Rotatory Polarization, Fresnel's Theory of Optical Rotation, Calculation of Angle of Rotation, Experimental Verification of Fresnel's Theory, Specific Rotation. Laurent's half-Shadow Polarimeter and Bi-quartz Polarimeter.

Text and Reference Books

1. Introduction to Electrodynamics by A.Z.Capri & P.V.Panat.(New Delhi: Narosa Pub.House).
2. Electromagnetics by Joseph A.Edminister 2nd ed.(New Delhi: Tata Mc Graw Hill, 2006).
3. Fundamentals of electromagnetics by M.A.W.Miah.(Tata Mc Graw Hill,1992)
4. Applied electromagnetism By Liang Chi Shen, Jin Au Kong (PWS Pub. Co., 1995)
5. David J. Griffiths, Introduction to Electrodynamics, 3rd edition, (Benjamin Cummings 1998).
6. J. D. Jackson, Classical Electrodynamics, 3rd edition, (Wiley, New York 1998).
7. M. Lifshitz and L. D. Landau, Classical Theory of Fields (Course of Theoretical Physics), 2nd Edition, (Pergamon Pr; 1981).

BSS-401	Applied Statistics	4L:1T:0P	4 Credits
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UNIT-1**(09 Lectures)**

Time Series: its different components, illustrations, additive and multiplicative models, determination of trend-graphic, semi-average, least square and moving average methods.

UNIT-2**(09 Lectures)**

Measures of seasonal variation-simple average, ratio to moving average, ratio to trend, link related method.

UNIT-3**(09 Lectures)**

IndexNumbers: Definition, construction of index numbers and problems there off or weighted and unweighted index numbers including Laspeyre's, Paasche's, Edgeworth-Marshalland Fisher's. Chain index numbers, conversion of fixed based to chain based index numbers and

UNIT-4**(09 Lectures)**

Demographic Methods: Sources of demographic data-census, register, ad-hoc survey, hospital records, demographic profiles of Indian censuses. Measurement of mortality, crude death rates, age specific death rates, infant mortality rates. Measurement of fertility –crude birth rate, general fertility rate, age-specific birth rate, total fertility rate, gross and net reproduction rate. Standadized death rates.

UNIT-5**(09 Lectures)**

Consumer price index numbers. Compilation of indices, baseshifting ,splicing and deflating of index numbers. Index of industrial and agriculture production, usage and limitations of index numbers. Complete life table, its main features and construction(Abridged life table).

Books Recommended

1. Montgomery,D.C.(2009):Introduction to Statistical Quality Control,6thEdition, Wiley India Pvt. Ltd.
2. GoonA.M.,GuptaM.K.and Dasgupta B.(2002):Fundamentals of Statistics,Vol.Ia.&II, 8thEdn. TheWorld Press, Kolkata.
1. Mukhopadhyay,P(2011):Applied Statistics,2ndedition revised reprint,Booksand Allied(P)Ltd.
2. Montgomery, D.C.and Runger,G.C.(2008):Applied Statistics and Probability for Engineers,3rdEditionreprint,WileyIndiaPvt.Ltd.

BSS-402	Statistical Techniques for Research Methods	3L:0T:0P	3 Credits
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Unit 1**(09 Lectures)**

Introduction: Meaning, objection and motivation in research, types of research, research approach, significance of research. Research problems: definition, selection and necessity of research problems.

Unit 2**(09 Lectures)**

Survey Methodology and Data Collection, inference and error in surveys, the target populations, sampling frames and coverage error, methods of data collection, non-response, questions and answers in surveys.

Unit 3**(09 Lectures)**

Processing, Data Analysis and Interpretation: Review of various techniques for data analysis covered in core statistics papers, techniques of interpretation, precaution in interpretation.

Unit 4**(09 Lectures)**

Develop a questionnaire, collect survey data pertaining to a research problem (such as gender discriminations in private v/s government sector, unemployment rates, removal of subsidy impact on service class v/s unorganized sectors), interpret the results and draw inferences.

Books Recommended

1. Kothari, C.R. (2009): Research Methodology: Methods and Techniques, 2nd Revised Edition reprint, New Age International Publishers.
2. Kumar, R (2011): Research Methodology: A Step - by - Step Guide for Beginners, SAGE Publication.

BSP-444	Electronics Devices & Circuit Theory Lab	0L:0T:2P	2 Credits
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Note: Select any ten experiments from the following list:

1. To verify the Thevenin, Norton, Superposition, and Maximum Power Transfer Theorem.
2. To measure the Input and Output Impedance of an Unknown Network and to convert it into Equivalent T and π Circuits.
3. To study (a) Half-wave Rectifier and (b) Full-wave Bridge Rectifier and investigate the effect of C, L and π filters.
4. To design a Semiconductor Power Supply of given rating using (a) Half wave, (b) Full wave or (c) Bridge rectifier and investigate the effect of C-filter.
5. To study the Forward and Reverse characteristics of a Zener Diode and to study its use as a Voltage Regulator.
6. To investigate simple regulation and stabilization circuits using Voltage Regulator ICs.
7. To determine the Characteristics of p-n junction of a Solar Cell.
8. To study the logic gate circuit with truth table.
9. To verify high gain audio amplifier 1213.
10. To study the CE Characteristics of a Transistor.
11. To study the various Transistor Biasing Configurations.
12. To design a CE Amplifier of a given gain (mid-gain) using Voltage Divider Bias.
13. To study the Frequency Response of Voltage Gain of a RC-Coupled Amplifier.
14. To design an Oscillator of given specifications using Transistors.

BSS-444	Statistical lab-IV	0L:0T:2P	2 Credits
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Note: Select any ten experiments from the following list:

1. Fitting of straight line by least squares method.
2. Fitting of parabolic curve by least squares method.
3. Trend by moving average method.
4. Seasonal indices by ratio to trend method.
5. Seasonal indices by ratio to moving average method.
6. Seasonal indices by link relative method.
7. Computation of measures of mortality.
8. Completion of life table.
9. Computation of measures of fertility and population growth.
10. Calculate price and quantity index numbers using simple and weighted average of price relatives.
11. To calculate the Chain Base index numbers.
12. To calculate consumer price index number.
13. Practical based on shifting of base, splicing and deflating of index numbers.

