

Admission Notification for
Mizoram University Engineering Entrance Examination 2014
(MZUEEE-2014)

MZU/EEE/A-10/2014/02

Date: 28/03/2014

Admission for first semester of 4 year B.Tech course in: - Electronics & Communication Engineering, Information Technology, Computer Engineering and Electrical Engineering.

Eligibility:-A candidate who has passed the higher secondary or 10+2 (Class XII) Examination or its equivalent from any recognized board having secured a minimum of 50% marks in aggregate with Physics, Chemistry, and Mathematics (relaxable by 5% for SC/ST candidates) shall be eligible for admission in B.Tech. Those appearing in the higher secondary or 10+2 (Class XII) final or equivalent examination in 2014 may also appear in MZUEEE 2014 provisionally.

Date of Birth:-Only those candidates whose date of birth falls on or after October 01, 1989 are eligible. However, in the case of Scheduled Caste (SC), Scheduled Tribe (ST) and Persons with Disabilities (PWD) candidates, upper age limit is relaxed by 5 years, i.e. SC, ST and PWD candidates who were born on or after October 01, 1984 are eligible. Date of birth as recorded in the Secondary Education Board/University certificate only will be taken as authentic.

Syllabus: As per JEE (main)-2014.

Admission for Lateral entry in 3rd semester of B.Tech course in:- Electronics & Communication Engineering, Information Technology, Computer Engineering and Electrical Engineering.
(Subject to availability of seat)

Eligibility:-

3 year diploma holder in engineering in relevant branch with a minimum of 60% marks may apply for lateral entry. Those appearing in the final examination in 2014 may also appear in MZUEEE 2014 provisionally.

Syllabus: please visit www.mzu.edu.in.

Prescribed application forms will be available in the office of the Controller of Examination, Mizoram University during office hours on payment of Rs 700/- (Rs 350/- for SC/ST Candidate) in cash or through Demand draft in favour of **Controller of Examination, Mizoram University**. Application forms can be obtained through post by remitting Rs 50/- extra as postal charges from Controller Office. Form downloaded from university website should be submitted with required fees. For details visit University website www.mzu.edu.in.

Last date of submission of application form: **30/04/2014**

Application forms duly completed in all respect are to be submitted to:-

Member Secretary

MZUEEE-2014

Dept. of Electrical Engineering

Mizoram University

Tanhril, Aizawl-796004, Mizoram

Phone :- 9206122464 (For any query)

MZU/EX. XXXIV
No

MIZORAM



AIZAWL

UNIVERSITY

Passport
size
Photograph

Application Form for admission into Post-Graduate/M. Phil/Ph.D./B.Tech/MBA Programme

1. Subject Year
2. (a) Name of the Applicant Mr/Ms
(IN BLOCK LETTERS)
(b) Permanent Address
(c) Mailing Address.....
..... Telephone No.
(d) Date of Birth (e) Blood Group (f) Nationality
3. Father's Name
4. Mother's Name
5. Do you belong to SC/ST/OBC/PH? Yes/No (Please Tick). If yes, please enclose relevant certificate.
6. Are you employed? Yes/No (Please Tick). If yes, please enclose Employer's No Objection Certificate mentioning Employer's Name and Address.
7. (a) Educational Qualifications (Matriculation onwards)

<i>Examinations</i>	<i>School/College (Board/University)</i>	<i>Subject</i>	<i>Year</i>	<i>Division</i>	<i>Percentage of Marks</i>

(b) For MBA Students only: MAT Score or appeared in MAT _____

8. Co-curricular Activities, if any
9. Scholarship, prize, medal or other distinctions won, if any

Sl. Nos. 10-13 for M. Phil/Ph.D. Candidates only

10. Please indicate, in order of preference, the area of special interest in the discipline or disciplines, you want to do further studies/research.

(1) _____ (2) _____

(3) _____ (4) _____

11. Please indicate your choice of courses in the programme.

(1) _____ (2) _____

(3) _____ (4) _____

12. (a) Have you applied for a Fellowship?

If so, please give the following details about the Fellowship applied for

<i>Name of Fellowship</i>	<i>Amount per month</i>	<i>Agency which awards it</i>	<i>Date of Application</i>	<i>Decision (if known)</i>

(b) If you do not get a Fellowship, are you prepared to join the programme and complete it?

13. Please explain in about 200 words why you want to pursue a further programme of study/research in the subject in a separate sheet and attach it to the application.

(Following are common for all the Programmes)

14. Do you have any claim under 5 & 6 of admission criterion as mentioned in Prospectus: Yes/No. If 'yes', please specify (and also attach documentary proof):

15. Any other information in support of your application _____

16. List of enclosures:

(1) _____ (2) _____

(3) _____ (4) _____

(5) _____ (6) _____

DECLARATION BY THE APPLICANT AND THE GUARDIAN

(a) I declare that the entries made by me in the form are correct to the best of my knowledge. I am aware that if any of the entries is found to be incorrect, my admission will be liable to cancellation.

(b) I undertake to abide by the rules of the University in force from time to time.

Countersignature of the Guardian with date

Signature of the Applicant with date

Important Instructions

(Please read the following instruction carefully before filling up the form)

- (a) All entries must be in the candidate's own handwriting
- (b) The form should be complete in every respect
- (c) The form should be submitted to the Head of the concerned Department
- (d) Students applying for more than one Course should fill in separate application forms.
- (e) The form should be accompanied by the following:-
 - (1) Attested Copies of High School/Higher Secondary Certificate in support of date of birth
 - (2) Attested Copies of mark sheets of various examinations.
 - (3) NOC from employer if employed.

**FOR OFFICE USE
ADMITTED/REGRETTE**

Date :

Head of Department

JEE MAIN 2014 SYLLABUS FOR CHEMISTRY:

Unit	Unit Topic	Topic Wise Syllabus
Section A: Physical Chemistry		
1	Some Basic Concepts in Chemistry	Matter and its nature, Dalton's atomic theory; Concept of atom, molecule, element and compound; Physical quantities and their measurements in Chemistry, precision and accuracy, significant figures, S.I. Units, dimensional analysis; Laws of chemical combination; Atomic and molecular masses, mole concept, molar mass, percentage composition, empirical and molecular formulae; Chemical equations and stoichiometry.
2	States of Matter	<p>Classification of matter into solid, liquid and gaseous states</p> <p>Gaseous State: Measurable properties of gases; Gas laws - Boyle's law, Charles's law, Graham's law of diffusion, Avogadro's law, Dalton's law of partial pressure; Concept of Absolute scale of temperature; Ideal gas equation; Kinetic theory of gases (only postulates); Concept of average, root mean square and most probable velocities; Real gases, deviation from Ideal behaviour, compressibility factor and van der Waals equation.</p> <p>Liquid State: Properties of liquids - vapour pressure, viscosity and surface tension and effect of temperature on them (qualitative treatment only).</p> <p>Solid State: Classification of solids: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea); Bragg's Law and its applications; Unit cell and lattices, packing in solids (fcc, bcc and hcp lattices), voids, calculations involving unit cell parameters, imperfection in solids; Electrical, magnetic and dielectric properties.</p>
3	Atomic Structure	Thomson and Rutherford atomic models and their limitations; Nature of electromagnetic radiation, photoelectric effect; Spectrum of hydrogen atom, Bohr model of hydrogen atom - its postulates, derivation of the relations for energy of the electron and radii of the different orbits, limitations of Bohr's model; Dual nature of matter, de-Broglie's relationship, Heisenberg uncertainty principle. Elementary ideas of quantum mechanics, quantum mechanical model of atom, its important features, concept of atomic orbitals as one electron wave functions; Variation of ψ and ψ^2 , with r for 1s and 2s orbitals; various quantum numbers (principal,

		angular momentum and magnetic quantum numbers) and their significance; shapes of s, p and d - orbitals, electron spin and spin quantum number; Rules for filling electrons in orbitals – aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of elements, extra stability of half-filled and completely filled orbitals.
4	Chemical Bonding And Molecular Structure	<p>Kossel - Lewis approach to chemical bond formation, concept of ionic and covalent bonds.</p> <p>Ionic Bonding: Formation of ionic bonds, factors affecting the formation of ionic bonds; calculation of lattice enthalpy.</p> <p>Covalent Bonding: Concept of electronegativity, Fajan's rule, dipole moment; Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules.</p> <p>Quantum mechanical approach to covalent bonding: Valence bond theory – Its important features, concept of hybridization involving s, p and d orbitals; Resonance.</p> <p>Molecular Orbital Theory - Its important features, LCAOs, types of molecular orbitals (bonding, antibonding), sigma and pi-bonds, molecular orbital electronic configurations of homonuclear diatomic molecules, concept of bond order, bond length and bond energy. Elementary idea of metallic bonding. Hydrogen bonding and its applications</p>
5	Chemical Thermodynamics	<p>Fundamentals of thermodynamics: System and surroundings, extensive and intensive properties, state functions, types of processes.</p> <p>First law of thermodynamics - Concept of work, heat internal energy and enthalpy, heat capacity, molar heat capacity; Hess's law of constant heat summation; Enthalpies of bond dissociation, combustion, formation, atomization, sublimation, phase transition, hydration, ionization and solution.</p> <p>Second law of thermodynamics; Spontaneity of processes; ΔS of the universe and ΔG of the system as criteria for spontaneity, ΔG° (Standard Gibbs energy change) and equilibrium constant.</p>
6	Solutions	Different methods for expressing concentration of solution - molality, molarity, mole fraction, percentage (by volume and mass both), vapour pressure of solutions and Raoult's Law – Ideal and non-ideal

		solutions, vapour pressure - composition, plots for ideal and nonideal solutions; Colligative properties of dilute solutions - relative lowering of vapour pressure, depression of freezing point, elevation of boiling point and osmotic pressure; Determination of molecular mass using colligative properties; Abnormal value of molar mass, van't Hoff factor and its significance.
7	Equilibrium	<p>Meaning of equilibrium, concept of dynamic equilibrium.</p> <p>Equilibria involving physical processes: Solid -liquid, liquid - gas and solid – gas equilibria, Henry's law, general characteristics of equilibrium involving physical processes.</p> <p>Equilibria involving chemical processes: Law of chemical equilibrium, equilibrium constants (K_p and K_c) and their significance, significance of ΔG and ΔG° in chemical equilibria, factors affecting equilibrium concentration, pressure, temperature, effect of catalyst; Le Chatelier's principle.</p> <p>Ionic equilibrium: Weak and strong electrolytes, ionization of electrolytes, various concepts of acids and bases (Arrhenius, Brnsted - Lowry and Lewis) and their ionization, acid - base equilibria (including multistage ionization) and ionization constants, ionization of water, pH scale, common ion effect, hydrolysis of salts and pH of their solutions, solubility of sparingly soluble salts and solubility products, buffer solutions.</p>
8	Redox Reactions And Electrochemistry	<p>Electronic concepts of oxidation and reduction, redox reactions, oxidation number, rules for assigning oxidation number, balancing of redox reactions. Electrolytic and metallic conduction, conductance in electrolytic solutions, specific and molar conductivities and their variation with concentration: Kohlrausch's law and its applications.</p> <p>Electrochemical cells - Electrolytic and Galvanic cells, different types of electrodes, electrode potentials including standard electrode potential, half - cell and cell reactions, emf of a Galvanic cell and its measurement; Nernst equation and its applications; Relationship between cell potential and Gibbs' energy change; Dry cell and lead accumulator; Fuel cells.</p>
9	Chemical Kinetics	Rate of a chemical reaction, factors affecting the rate of reactions: concentration, temperature, pressure and catalyst; elementary and complex reactions, order and molecularity of reactions, rate law, rate constant and its units, differential and integral forms of zero and first order reactions, their characteristics and half - lives,

		effect of temperature on rate of reactions – Arrhenius theory, activation energy and its calculation, collision theory of bimolecular gaseous reactions (no derivation).
10	Surface Chemistry	<p>Absorption- Physisorption and chemisorption and their characteristics, factors affecting absorption of gases on solids - Freundlich and Langmuir absorption isotherms, absorption from solutions.</p> <p>Colloidal state - distinction among true solutions, colloids and suspensions, classification of colloids - lyophilic, lyophobic; multi molecular, macromolecular and associated colloids (micelles), preparation and properties of colloids - Tyndall effect, Brownian movement, electrophoresis, dialysis, coagulation and flocculation; Emulsions and their characteristics.</p>
Section – B : Inorganic Chemistry		
11	Classification Of Elements And Periodicity In Properties	Modern periodic law and present form of the periodic table, s, p, d and f block elements, periodic trends in properties of elements atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity
12	General Principles And Processes Of Isolation Of Metals	Modes of occurrence of elements in nature, minerals, ores; Steps involved in the extraction of metals - concentration, reduction (chemical and electrolytic methods) and refining with special reference to the extraction of Al, Cu, Zn and Fe; Thermodynamic and electrochemical principles involved in the extraction of metals.
13	Hydrogen	Position of hydrogen in periodic table, isotopes, preparation, properties and uses of hydrogen; Physical and chemical properties of water and heavy water; Structure, preparation, reactions and uses of hydrogen peroxide; Hydrogen as a fuel.
14	S - Block Elements (Alkali And Alkaline Earth Metals)	<p>Group - 1 and 2 Elements</p> <p>General introduction, electronic configuration and general trends in physical and chemical properties of elements, anomalous properties of the first element of each group, diagonal relationships. Preparation and properties of some important compounds - sodium carbonate and sodium hydroxide; Industrial uses of lime, limestone, Plaster of Paris and cement; Biological significance of Na, K, Mg and Ca.</p>

15	P - Block Elements	<p>Group - 13 to Group 18 Elements General Introduction: Electronic configuration and general trends in physical and chemical properties of elements across the periods and down the groups; unique behaviour of the first element in each group. Groupwise study of the p – block elements</p> <p>Group – 13 Preparation, properties and uses of boron and aluminium; properties of boric acid, diborane, boron trifluoride, aluminium chloride and alums.</p> <p>Group – 14 Allotropes of carbon, tendency for catenation; Structure & properties of silicates, and zeolites.</p> <p>Group – 15 Properties and uses of nitrogen and phosphorus; Allotropic forms of phosphorus; Preparation, properties, structure and uses of ammonia, nitric acid, phosphine and phosphorus halides, (PCl₃, PCl₅); Structures of oxides and oxoacids of phosphorus.</p> <p>Group – 16 Preparation, properties, structures and uses of ozone; Allotropic forms of sulphur; Preparation, properties, structures and uses of sulphuric acid (including its industrial preparation); Structures of oxoacids of sulphur.</p> <p>Group – 17 Preparation, properties and uses of hydrochloric acid; Trends in the acidic nature of hydrogen halides; Structures of Interhalogen compounds and oxides and oxoacids of halogens.</p> <p>Group –18 Occurrence and uses of noble gases; Structures of fluorides and oxides of xenon.</p>
16	d – and f – Block Elements	<p>Transition Elements General introduction, electronic configuration, occurrence and characteristics, general trends in properties of the first row transition elements - physical properties, ionizationenthalpy, oxidation states, atomic radii, colour, catalytic behaviour, magnetic properties, complex formation, interstitial compounds, alloy formation; Preparation, properties and uses of K₂Cr₂O₇ and K₂MnO₄.</p> <p>Inner Transition Elements Lanthanoids - Electronic configuration, oxidation states and lanthanoid contraction.</p>

		Actinoids - Electronic configuration and oxidation states.
17	Co-Ordination Compounds	Introduction to co-ordination compounds, Werner's theory; ligands, coordination number, denticity, chelation; IUPAC nomenclature of mononuclear coordination compounds, isomerism; Bonding-Valence bond approach and basic ideas of Crystal field theory, colour and magnetic properties; Importance of co-ordination compounds (in qualitative analysis, extraction of metals and in biological systems).
18	Environmental Chemistry	<p>Environmental pollution - Atmospheric, water and soil. Atmospheric pollution - Tropospheric and Stratospheric</p> <p>Tropospheric pollutants – Gaseous pollutants: Oxides of carbon, nitrogen and sulphur, hydrocarbons; their sources, harmful effects and prevention; Green house effect and Global warming; Acid rain;</p> <p>Particulate pollutants: Smoke, dust, smog, fumes, mist; their sources, harmful effects and prevention.</p> <p>Stratospheric pollution- Formation and breakdown of ozone, depletion of ozone layer - its mechanism and effects.</p> <p>Water Pollution - Major pollutants such as, pathogens, organic wastes and chemical pollutants; their harmful effects and prevention.</p> <p>Soil pollution - Major pollutants such as: Pesticides (insecticides, herbicides and fungicides), their harmful effects and prevention. Strategies to control environmental pollution.</p>
Section-C: Organic Chemistry		
19	Purification And Characterisation Of Organic Compounds	<p>Purification - Crystallization, sublimation, distillation, differential extraction and chromatography - principles and their applications.</p> <p>Qualitative analysis - Detection of nitrogen, sulphur, phosphorus and halogens.</p> <p>Quantitative analysis (basic principles only) - Estimation of carbon, hydrogen, nitrogen, halogens, sulphur, phosphorus. Calculations of empirical formulae and molecular formulae; Numerical problems in organic quantitative analysis.</p>

20	Some Basic Principles Of Organic Chemistry	<p>Tetravalency of carbon; Shapes of simple molecules - hybridization (s and p); Classification of organic compounds based on functional groups: - C = C -, - C h C - and those containing halogens, oxygen, nitrogen and sulphur; Homologous series; Isomerism - structural and stereoisomerism.</p> <p>Nomenclature (Trivial and IUPAC) Covalent bond fission - Homolytic and heterolytic: free radicals, carbocations and carbanions; stability of carbocations and free radicals, electrophiles and nucleophiles.</p> <p>Electronic displacement in a covalent bond - Inductive effect, electromeric effect, resonance and hyperconjugation</p>
21	Hydrocarbons	<p>Classification, isomerism, IUPAC nomenclature, general methods of preparation, properties and reactions.</p> <p>Alkanes - Conformations: Sawhorse and Newman projections (of ethane); Mechanism of halogenation of alkanes.</p> <p>Alkenes - Geometrical isomerism; Mechanism of electrophilic addition: addition of hydrogen, halogens, water, hydrogen halides (Markownikoff's and peroxide effect); Ozonolysis and polymerization.</p> <p>Alkynes - Acidic character; Addition of hydrogen, halogens, water and hydrogen halides; Polymerization.</p> <p>Aromatic hydrocarbons - Nomenclature, benzene - structure and aromaticity; Mechanism of electrophilic substitution: halogenation, nitration, Friedel – Craft's alkylation and acylation, directive influence of functional group in mono-substituted benzene</p>
22	Organic Compounds Containing Halogens	<p>General methods of preparation, properties and reactions; Nature of C-X bond; Mechanisms of substitution reactions. Uses; Environmental effects of chloroform & iodoform.</p>
23	Organic Compounds Containing Oxygen	<p>General methods of preparation, properties, reactions and uses.</p> <p>Alcohols, Phenols And Ethers Alcohols: Identification of primary, secondary and tertiary alcohols; mechanism of dehydration.</p> <p>Phenols: Acidic nature, electrophilic substitution reactions: halogenation, nitration and sulphonation, Reimer - Tiemann reaction.</p>

		<p>Ethers: Structure.</p> <p>Aldehyde and Ketones: Nature of carbonyl group; Nucleophilic addition to $>C=O$ group, relative reactivities of aldehydes and ketones; Important reactions such as – Nucleophilic addition reactions (addition of HCN, NH_3 and its derivatives), Grignard reagent; oxidation; reduction (Wolff Kishner and Clemmensen); acidity of α-hydrogen, aldol condensation, Cannizzaro reaction, Haloform reaction; Chemical tests to distinguish between aldehydes and Ketones.</p> <p>Carboxylic Acids Acidic strength and factors affecting it</p>
24	Organic Compounds Containing Nitrogen	<p>General methods of preparation, properties, reactions and uses. Amines: Nomenclature, classification, structure, basic character and identification of primary, secondary and tertiary amines and their basic character. Diazonium Salts: Importance in synthetic organic chemistry.</p>
25	Polymers	<p>General introduction and classification of polymers, general methods of polymerization addition and condensation, copolymerization; Natural and synthetic rubber and vulcanization; some important polymers with emphasis on their monomers and uses - polythene, nylon, polyester and bakelite.</p>
26	Biomolecules	<p>General introduction and importance of biomolecules.</p> <p>Carbohydrates - Classification: aldoses and ketoses; monosaccharides (glucose and fructose) and constituent monosaccharides of oligosaccharides (sucrose, lactose and maltose).</p> <p>Proteins - Elementary Idea of α-amino acids, peptide bond, polypeptides; Proteins: primary, secondary, tertiary and quaternary structure (qualitative idea only), denaturation of proteins, enzymes.</p> <p>Vitamins - Classification and functions.</p> <p>Nucleic Acids - Chemical constitution of DNA and RNA. Biological functions of nucleic acids.</p>
27	Chemistry In Everyday Life	<p>Chemicals in medicines - Analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamins – their meaning and common examples.</p>

		<p>Chemicals in food - Preservatives, artificial sweetening agents - common examples.</p> <p>Cleansing agents - Soaps and detergents, cleansing action</p>
28	Principles Related To Practical Chemistry	<ul style="list-style-type: none"> • Detection of extra elements (N,S, halogens) in organic compounds; Detection of the following functional groups: hydroxyl (alcoholic and phenolic), carbonyl (aldehyde and ketone), carboxyl and amino groups in organic compounds. • Chemistry involved in the preparation of the following: Inorganic compounds: Mohr's salt, potash alum. Organic compounds: Acetanilide, pnitroacetanilide, aniline yellow, iodoform. • Chemistry involved in the titrimetric exercises - Acids bases and the use of indicators, oxalic-acid vs KMnO_4, Mohr's salt vs KMnO_4 • Chemical principles involved in the qualitative salt analysis: <ul style="list-style-type: none"> • Cations - Pb^{2+}, Cu^{2+}, Al^{3+}, Fe^{3+}, Zn^{2+}, Ni^{2+}, Ca^{2+}, Ba^{2+}, Mg^{2+}, NH_4^+. • Anions- CO_3^{2-}, S^{2-}, SO_4^{2-}, NO_2^-, NO_3^-, Cl^-, Br^-, I^-. • (Insoluble salts excluded). • Chemical principles involved in the following experiments: <ol style="list-style-type: none"> 1. Enthalpy of solution of CuSO_4 2. Enthalpy of neutralization of strong acid and strong base. 3. Preparation of lyophilic and lyophobic sols. 4. Kinetic study of reaction of iodide ion with hydrogen peroxide at room temperature.

JEE MAIN 2014 SYLLABUS FOR MATHEMATICS:

Unit	Unit Topic	Topic wise Syllabus
1	Sets, Relations And Functions	Sets and their representation; Union, intersection and complement of sets and their algebraic properties; Power set; Relation, Types of relations, equivalence relations, functions;. One-one, into and onto functions, composition of functions
2	Complex Numbers and Quadratic Equations	Complex numbers as ordered pairs of reals, Representation of complex numbers in the form $a+ib$ and their representation in a plane, Argand diagram, algebra of complex numbers, modulus and argument (or amplitude) of a complex number, square root of a complex number, triangle inequality, Quadratic equations in real and complex number system and their solutions. Relation between roots and coefficients, nature of roots, formation of quadratic equations with given roots.
3	Matrices And Determinants	Matrices, algebra of matrices, types of matrices, determinants and matrices of order two and three. Properties of determinants, evaluation of determinants, area of triangles using determinants. Adjoint and evaluation of inverse of a square matrix using determinants and elementary transformations, Test of consistency and solution of simultaneous linear equations in two or three variables using determinants and matrices.
4	Permutations And Combinations	Fundamental principle of counting, permutation as an arrangement and combination as selection, Meaning of $P(n,r)$ and $C(n,r)$, simple applications
5	Mathematical Induction	Principle of Mathematical Induction and its simple applications
6	Binomial Theorem And Its Simple Applications	Binomial theorem for a positive integral index, general term and middle term, properties of Binomial coefficients and simple applications
7	Sequences And Series	Arithmetic and Geometric progressions, insertion of arithmetic, geometric means between two given numbers. Relation between A.M. and G.M. Sum upto n terms of special series: S_n , S_{n^2} , S_{n^3} . Arithmetic – Geometric progression

8	Limit, Continuity And Differentiability	<p>Real valued functions, algebra of functions, polynomials, rational, trigonometric, logarithmic and exponential functions, inverse functions. Graphs of simple functions.</p> <p>Limits, continuity and differentiability. Differentiation of the sum, difference, product and quotient of two functions. Differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, composite and implicit functions; derivatives of order upto two. Rolle's and Lagrange's Mean Value Theorems.</p> <p>Applications of derivatives: Rate of change of quantities, monotonic increasing and decreasing functions, Maxima and minima of functions of one variable, tangents and normals</p>
9	Integral Calculus	<p>Integral as an anti derivative. Fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration using trigonometric identities.</p> <p>Integral as limit of a sum. Fundamental Theorem of Calculus. Properties of definite integrals. Evaluation of definite integrals, determining areas of the regions bounded by simple curves in standard form</p> <p>Evaluation of simple integrals of the type:</p> $\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{a^2 - x^2}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c},$ $\int \frac{dx}{\sqrt{ax^2 + bx + c}}, \int \frac{(px+q)dx}{ax^2 + bx + c}, \int \frac{(px+q)dx}{\sqrt{ax^2 + bx + c}}$ $\int \sqrt{a^2 \pm x^2} dx \quad \int \sqrt{x^2 - a^2} dx$
10	Differential Equations	<p>Ordinary differential equations, their order and degree. Formation of differential equations. Solution of differential equations by the method of separation of variables, solution of homogeneous and linear differential equations of the type</p> $\frac{dv}{dx} + p(x)y = q(x)$
11	Coordinate Geometry	<p>Cartesian system of rectangular coordinates 10 in a plane, distance formula, section formula, locus and its equation, translation of axes, slope of a line, parallel and perpendicular lines, intercepts of a line on the coordinate axes.</p> <p>Straight lines Various forms of equations of a line, intersection of lines,</p>

		<p>angles between two lines, conditions for concurrence of three lines, distance of a point from a line, equations of internal and external bisectors of angles between two lines, coordinates of centroid, orthocentre and circumcentre of a triangle, equation of family of lines passing through the point of intersection of two lines.</p> <p>Circles, conic sections Standard form of equation of a circle, general form of the equation of a circle, its radius and centre, equation of a circle when the end points of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to a circle, equation of the tangent. Sections of cones, equations of conic sections (parabola, ellipse and hyperbola) in standard forms, condition for $y = mx + c$ to be a tangent and point (s) of tangency.</p>
12	Three Dimensional Geometry	<p>Coordinates of a point in space, distance between two points, section formula, direction ratios and direction cosines, angle between two intersecting lines. Skew lines, the shortest distance between them and its equation. Equations of a line and a plane in different forms, intersection of a line and a plane, coplanar lines</p>
13	Vector Algebra	<p>Vectors and scalars, addition of vectors, components of a vector in two dimensions and three dimensional space, scalar and vector products, scalar and vector triple product.</p>
14	Statistics And Probability	<p>Measures of Dispersion: Calculation of mean, median, mode of grouped and ungrouped data calculation of standard deviation, variance and mean deviation for grouped and ungrouped data.</p> <p>Probability: Probability of an event, addition and multiplication theorems of probability, Baye's theorem, probability distribution of a random variate, Bernoulli trials and Binomial distribution.</p>
15	Trigonometry	<p>Trigonometrical identities and equations. Trigonometrical functions. Inverse trigonometrical functions and their properties. Heights and Distances</p>
16	Mathematical Reasoning	<p>Statements, logical operations and, or, implies, implied by, if and only if. Understanding of tautology, contradiction, converse and contrapositive</p>

JEE MAIN 2014 SYLLABUS FOR PHYSICS:

Students may note that JEE Main 2014 Syllabus contains two Sections

- **Section A:** pertaining to the Theory Part having 80% weightage,
- **Section B:** pertaining to the Practical Component (Experimental Skills) having 20% weightage.

Unit	Unit Topic	Topic Wise Syllabus
Section A		
1	Physics And Measurement	Physics, technology and society, S I units, Fundamental and derived units. Least count, accuracy and precision of measuring instruments, Errors in measurement, Dimensions of Physical quantities, dimensional analysis and its applications
2	Kinematics	Frame of reference. Motion in a straight line: Position-time graph, speed and velocity. Uniform and nonuniform motion, average speed and instantaneous velocity Uniformly accelerated motion, velocity-time, position-time graphs, relations for uniformly accelerated motion. Scalars and Vectors, Vector addition and Subtraction, Zero Vector, Scalar and Vector products, Unit Vector, Resolution of a Vector. Relative Velocity, Motion in a plane, Projectile Motion, Uniform Circular Motion
3	Laws Of Motion	Force and Inertia, Newton's First Law of motion; Momentum, Newton's Second Law of motion; Impulse; Newton's Third Law of motion. Law of conservation of linear momentum and its applications, Equilibrium of concurrent forces. Static and Kinetic friction, laws of friction, rolling friction. Dynamics of uniform circular motion: Centripetal force and its applications.
4	Work, Energy And Power	Work done by a constant force and a variable force; kinetic and potential energies, workenergy theorem, power. Potential energy of a spring, conservation of mechanical energy, conservative and nonconservative forces; Elastic and inelastic collisions in one and two dimensions
5	Rotational Motion	Centre of mass of a two-particle system, Centre of mass of a rigid body; Basic concepts of rotational motion; moment of a force, torque, angular momentum, conservation of angular momentum and its applications; moment of inertia, radius of gyration. Values of moments of inertia for simple geometrical objects, parallel and perpendicular axes theorems and their applications. Rigid body rotation, equations of rotational motion
6	Gravitation	The universal law of gravitation. Acceleration due to

		gravity and its variation with altitude and depth. Kepler's laws of planetary motion. Gravitational potential energy; gravitational potential. Escape velocity. Orbital velocity of a satellite. Geo-stationary satellites
7	Properties Of Solids And Liquids	Elastic behaviour, Stress-strain relationship, Hooke's Law, Young's modulus, bulk modulus, modulus of rigidity. Pressure due to a fluid column; Pascal's law and its applications. Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, Reynolds number. Bernoulli's principle and its applications. Surface energy and surface tension, angle of contact, application of surface tension - drops, bubbles and capillary rise. Heat, temperature, thermal expansion; specific heat capacity, calorimetry; change of state, latent heat. Heat transfer conduction, convection and radiation, Newton's law of cooling
8	Thermodynamics	Thermal equilibrium, zeroth law of thermodynamics, concept of temperature. Heat, work and internal energy. First law of thermodynamics. Second law of thermodynamics: reversible and irreversible processes. Carnot engine and its efficiency
9	Kinetic Theory Of Gases	Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of gases - assumptions, concept of pressure. Kinetic energy and temperature: rms speed of gas molecules; Degrees of freedom, Law of equipartition of energy, applications to specific heat capacities of gases; Mean free path, Avogadro's number
10	Oscillations And Waves	Periodic motion - period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (S.H.M.) and its equation; phase; oscillations of a spring - restoring force and force constant; energy in S.H.M. - kinetic and potential energies; Simple pendulum - derivation of expression for its time period; Free, forced and damped oscillations, resonance. Wave motion. Longitudinal and transverse waves, speed of a wave. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, Standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect in sound
11	Electrostatics	Electric charges: Conservation of charge, Coulomb's law - forces between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field: Electric field due to a point charge, Electric field lines, Electric dipole, Electric field due to a dipole, Torque on a dipole in a uniform

		electric field. Electric flux, Gauss's law and its applications to find field due to infinitely long uniformly charged straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell. Electric potential and its calculation for a point charge, electric dipole and system of charges; Equipotential surfaces, Electrical potential energy of a system of two point charges in an electrostatic field. Conductors and insulators, Dielectrics and electric polarization, capacitor, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, Energy stored in a capacitor
12	Current Electricity	Electric current, Drift velocity, Ohm's law, Electrical resistance, Resistances of different materials, V-I characteristics of Ohmic and nonohmic conductors, Electrical energy and power, Electrical resistivity, Colour code for resistors; Series and parallel combinations of resistors; Temperature dependence of resistance. Electric Cell and its Internal resistance, potential difference and emf of a cell, combination of cells in series and in parallel. Kirchhoff's laws and their applications. Wheatstone bridge, Metre bridge. Potentiometer - principle and its applications.
13	Magnetic Effects Of Current And Magnetism	Biot - Savart law and its application to current carrying circular loop. Ampere's law and its applications to infinitely long current carrying straight wire and solenoid. Force on a moving charge in uniform magnetic and electric fields. Cyclotron. Force on a current carrying conductor in a uniform magnetic field. Force between two parallel current carrying conductors-definition of ampere. Torque experienced by a current loop in uniform magnetic field; Moving coil galvanometer, its current sensitivity and conversion to ammeter and voltmeter. Current loop as a magnetic dipole and its magnetic dipole moment. Bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements. Para-, dia- and ferro- magnetic substances. Magnetic susceptibility and permeability, Hysteresis, Electromagnets and permanent magnets.
14	Electromagnetic Induction And Alternating Currents	Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance. Alternating currents, peak and rms value of alternating current/ voltage; reactance and impedance; LCR series circuit, resonance; Quality factor, power in AC circuits, wattless current. AC generator and transformer
15	Electromagnetic Waves	Electromagnetic waves and their characteristics.

		<p>Transverse nature of electromagnetic waves. Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, Xrays, gamma rays). Applications of e.m. waves. Reflection and refraction of light at plane and spherical surfaces, mirror formula, Total internal reflection and its applications, Deviation and Dispersion of light by a prism, Lens Formula, Magnification, Power of a Lens, Combination of thin lenses in contact, Microscope and Astronomical Telescope (reflecting and refracting) and their magnifying powers. Wave optics: wavefront and Huygens' principle, Laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes, Polarisation, plane polarized light; Brewster's law, uses of plane polarized light and Polaroids</p>
16	Optics	<p>Reflection and refraction of light at plane and spherical surfaces, mirror formula, Total internal reflection and its applications, Deviation and Dispersion of light by a prism, Lens Formula, Magnification, Power of a Lens, Combination of thin lenses in contact, Microscope and Astronomical Telescope (reflecting and refracting) and their magnifying powers.</p> <p>Wave optics: wavefront and Huygens' principle, Laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes, Polarisation, plane polarized light; Brewster's law, uses of plane polarized lights and Polaroids</p>
17	Dual Nature of Matter and radiation	<p>Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation; particle nature of light. Matter waves-wave nature of particle, de Broglie relation. DavissonGermer experiment</p>
18	Atoms and Nuclei	<p>Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivity-alpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number, nuclear fission and fusion.</p>

19	Electronic Devices	Semiconductors; semiconductor diode: I-V characteristics in forward and reverse bias; diode as a rectifier; I-V characteristics of LED, photodiode, solar cell and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch
20	Communication Systems	Propagation of electromagnetic waves in the atmosphere; Sky and space wave propagation, Need for modulation, Amplitude and Frequency Modulation, Bandwidth of signals, Bandwidth of Transmission medium, Basic Elements of a Communication System (Block Diagram only).
Section B : Familiarity with the basic approach and observations of the experiments and activities given below:		
21	Experimental Skills	<ol style="list-style-type: none"> 1. Vernier callipers-its use to measure internal and external diameter and depth of a vessel. 2. Screw gauge-its use to determine thickness/diameter of thin sheet/wire. 3. Simple Pendulum-dissipation of energy by plotting a graph between square of amplitude and time. 4. Metre Scale - mass of a given object by principle of moments. 5. Young's modulus of elasticity of the material of a metallic wire. 6. Surface tension of water by capillary rise and effect of detergents. 7. Co-efficient of Viscosity of a given viscous liquid by measuring terminal velocity of a given spherical body. 8. Plotting a cooling curve for the relationship between the temperature of a hot body and time. 9. Speed of sound in air at room temperature using a resonance tube. 10. Specific heat capacity of a given (i) solid and (ii) liquid by method of mixtures.

		<p>11. Resistivity of the material of a given wire using metre bridge.</p> <p>12. Resistance of a given wire using Ohm's law.</p> <p>13. Potentiometer – (i) Comparison of emf of two primary cells. (ii) Determination of internal resistance of a cell.</p> <p>14. Resistance and figure of merit of a galvanometer by half deflection method.</p> <p>15. Focal length of: (i) Convex mirror (ii) Concave mirror, and (iii) Convex lens using parallax method.</p> <p>16. Plot of angle of deviation vs angle of incidence for a triangular prism.</p> <p>17. Refractive index of a glass slab using a travelling microscope.</p> <p>18. Characteristic curves of a p-n junction diode in forward and reverse bias.</p> <p>19. Characteristic curves of a Zener diode and finding reverse break down voltage.</p> <p>20. Characteristic curves of a transistor and finding current gain and voltage gain.</p> <p>21. Identification of Diode, LED, Transistor, IC, Resistor, Capacitor from mixed collection of such items.</p> <p>22. Using multimeter to: (i) Identify base of a transistor (ii) See the unidirectional flow of current in case of a diode and an LED. (iii) Check the correctness or otherwise of a given electronic component (diode, transistor or IC)</p>
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Syllabus of lateral entry in B.Tech in Computer Science and Engineering (Mizoram University Engineering Entrance Examination)

Computer Organization & Architecture: Evolution of Computers; Numbers representation – Binary, Octal, Decimal, Hexadecimal; CPU – ALU, Control Unit, Architectures; Memory – Storage units, RAM, different ROMs, cache, Hard Disks; IO Devices – Keyboard, Monitor, Printers.

Computer Networks: Concepts; Network Architectures; Protocols, interfaces and services; OSI reference Model – Layers and their tasks; Networks – Telephone, internet, LAN, WAN, cable; Error control; Connection-oriented & Connectionless networks; Switching – Circuit, Message and Packet; Applications of Networks.

Object Oriented Methodologies: Overview – Need and advantages, characteristics, comparisons with procedural oriented; Concepts – Objects, classes, data encapsulation, inheritance, polymorphism, operator and function (method) overloading; Analysis and Design applications;

Database Management Systems: Introduction; Data models, schema and instances; Architecture; ER diagram, DDL and DML; SQL – SELECT, INSERT DELETE, UPDATE, ALTER, views etc; Functional Dependencies; Normalisation; Transaction Processing; Concurrency Control; Security and Integrity; Distributed databases;

Operating Systems: Introduction – Concepts, structure; Processes – Creation, scheduling algorithms, IPC, Memory management – replacement algorithms, paging, segmentation, virtual memory; Files – Files & Directories, File systems, security; I/O – Devices, serial & parallel, clocks, transfer modes (Programmed, Interrupt, DMA); Deadlocks; Distributed operating Systems.

Data structure and C Programming: Introductions; Functions – calling with/ without arguments, pass by values/ references, returning values; declarations and definitions of identifiers; Operators – Arithmetic, relational, logical, assignment, conditional, ternary; variables – declarations, usage, scope; statements and conditions; loop control – while, for, do-while; structures and unions; sample programs. sorting, searching, link list, arrays.

**Syllabus of lateral entry in B.Tech in Electronics & Communication Engineering
(Mizoram University Engineering Entrance Examination)**

Electronics device and Circuit : Diodes, Half wave, full wave rectifier, Zener Diode, Voltage regulator Bipolar Junction Transistor(BJT), Common Base, Common Collector, Common Emitter configuration, Biasing circuit, Field Effect Transistor, Light Emitting Diode, Silicon Control Rectifier (SCR).fundamental of Operational Amplifier(OP-AMP).

Switching Circuits: Switching action of transistor, multivibrator, Asatable multivibrator, Monostable multivibartor, bistable multivibartor.

Digital Electronics : Binary number system, Decimal to binary conversion, binary to decimal conversion, octal, hexadecimal , binary addition, subtraction, logic gates, De-Morgan's theorem, Boolean algebra, half adder, Full adder, Flip Flop, combinational circuits.

Communication: Modulation, need of modulation, Amplitude Modulation(AM), Frequency modulation(FM), Generation of AM and FM, Demodulation, Pre-emphasis, De-emphasis, Principle of radio transmission and reception, radio receiver, Television fundamental, monochrome and colour television.

Wave propagation : Basic concept of antenna, types of wave propagation, surface wave propagation, space wave propagation, duct propagation, ionospheric propagation. Transmission lines, charactersictics impedance of coaxial and two wire lines, Basic concept of wave guides.

Instrumentation and measurement: Electrical measuring instruments, Galvanometer, Ammeter, power measurement, cathode ray oscilloscope (CRO), Digital meters.

Microprocessor: Basic concepts of Microprocessor, Instruction sets of 8-bit microprocessor 8085, 8-bit address bus, data bus, accumulator, registers, Interrupt, peripherals.

Mizoram University
School of Engineering and Technology
S Y L L A B I: LATERAL ENTRY
ELECTRICAL ENGINEERING

Electrical Circuits: Phasors and phasor algebra, balanced and unbalanced poly-phase circuit, Test signals, Star-Delta transformation, Network theorems, Parameters of electromagnetic circuits, resonance in R-L-C Series and Parallel circuits, Network analysis by mesh and node methods.

Basic Electronics: Conductors, Semiconductors and Insulators: Electrical Properties, Band Diagram, Formation of P-N Junction, Zener Diode, Rectifier, Principle and Mechanism of Transistor and FET.

Electrical Engineering Materials: Conducting, Insulating materials and Magnetic materials, Properties and applications

Electrical Instruments and Measurements: Principles of measurements: Classification, accuracy and sensitivity, damping and control forces, shunt and multiplier, Measurement of resistance: Low, medium and high. Principle and uses of DC potentiometers, AC Bridges. Indicating instruments: Multimeter, PF meters, synchroscope.

Electrical Machines: Classification of D.C. machines: Constructional features, e.m.f., torque, excitations, motor performance, speed, power, size considerations, speed control, efficiency.

Transformers: Induced e.m.f., equivalent circuits, regulation, different efficiencies. Three phase induction machines: Torque characteristics, Starting, equivalent Circuits.

Generation, Transmission and Distribution:

Generation: Thermal, Hydel and Nuclear Power Stations, Prime movers and alternators.

Transmission: Voltage levels, line conductors, electrical line parameters of short and medium lines, voltage regulation, corona.

Distribution: D.C. and A.C. systems, voltage level, types of distribution feeders and distributors, voltage drop and effects, power factor improvement plant. **Switchgear:** Switches, isolators, circuit breakers and their types. Protection: Fault current and protective devices, fuses, relay functions, alternator, over voltage-causes.

Power Electronics: Power diodes and Darlington Pair. Thyristor: Principle, thyristor family, firing circuits, applications, Selenium rectifiers, uncontrolled and controlled rectification, Power MOSFETS.

Digital Electronics: Digital signals, gates, Boolean algebra, logic families, multiplexures / demultiplexure, Encoders/decoders, flip-flops, registers, counters and applications of logic gates, OPAMPS in timing circuits, A/D and D/A conversion.

Microprocessor and Computer Programming: Evolution of Microprocessor, specific feature of Microprocessor, explanation of 8085 Microprocessor, Instruction cycle of 8085 Microprocessor, application of Microprocessor, Concept of low level and high level languages, Block-diagram, concept of flow chart, and algorithm, Assemblers, Macros, sub-routines, co-routines, loaders, linkers, editors and compilers, programming and file handling in C and C++.

Syllabus of lateral entry in B.Tech in Information & Technology
(Mizoram University Engineering Entrance Examination)

Computer Organization & Architecture: Evolution of Computers; Numbers representation – Binary, Octal, Decimal, Hexadecimal; CPU – ALU, Control Unit, Architectures; Memory – Storage units, RAM, different ROMs, cache, Hard Disks; IO Devices – Keyboard, Monitor, Printers.

Computer Networks: Concepts; Network Architectures; Protocols, interfaces and services; OSI reference Model – Layers and their tasks; Networks – Telephone, internet, LAN, WAN, cable; Error control; Connection-oriented & Connectionless networks; Switching – Circuit, Message and Packet; Applications of Networks.

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Operating Systems: Introduction – Concepts, structure; Processes – Creation, scheduling algorithms, IPC, Memory management – replacement algorithms, paging, segmentation, virtual memory; Files – Files & Directories, File systems, security; I/O – Devices, serial & parallel, clocks, transfer modes (Programmed, Interrupt, DMA); Deadlocks; Distributed operating Systems.

Data structure and C Programming: Introductions; Functions – calling with/ without arguments, pass by values/ references, returning values; declarations and definitions of identifiers; Operators – Arithmetic, relational, logical, assignment, conditional, ternary; variables – declarations, usage, scope; statements and conditions; loop control – while, for, do-while; structures and unions; sample programs. sorting, searching, link list, arrays.