



Karunya INSTITUTE OF TECHNOLOGY AND SCIENCES

(Declared as Deemed to be University under Sec. 3 of the UGC Act. 1956)

A CHRISTIAN MINORITY RESIDENTIAL INSTITUTION

AICTE Approved & NAAC Accredited

Karunya Nagar, Coimbatore - 641 114, Tamil Nadu, India.

(Appearing and qualifying in Karunya Entrance Examination - 2019 (KEE-2019) are mandatory for confirming the admission in B.Tech., B.Sc. Agriculture and B.Sc. Horticulture Programmes - For details call Toll Free No. 1800 425 4300)

KARUNYA ENTRANCE EXAMINATION - 2019 (KEE-2019)

Date: April 27, 2019 - Time: 10.00 AM to 12.30 PM (conducted across India)

The pattern for Karunya Entrance Examination 2019 (KEE-2019) (*OMR based test*) is mentioned below:

For B.Tech. Programmes (Other than bio courses):

Part A: Mathematics - 45 marks

Part B: Physics - 15 marks

Part C: Chemistry - 15 marks

Part D: General Aptitude - 15 marks

Part E: General Ethics / Christian Values - 10 marks

For B.Tech. Biotechnology*, Food Processing Technology* and B.Sc. Agriculture* / Horticulture* Programmes:

Part A: Biology - 45 marks

Part B: Physics - 15 marks

Part C: Chemistry - 15 marks

Part D: General Aptitude - 15 marks

Part E: General Ethics / Christian Values - 10 marks

- *Candidates those who studied Mathematics instead of Biology in +2 can choose entrance examination with PCM instead of PCB.
- **There will be negative mark of 0.25 for every wrong answer. The time duration will be 2 ½ hours (10.00 AM - 12.30 PM).**



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KARUNYA ENTRANCE EXAMINATION - 2018 (KEE-2019) CENTRES

Karunya Entrance Examination - 2019 (KEE-2019) will be conducted in 53 places (listed below) across India during April 27, 2018 (10.00 AM to 12.30 PM).

Centre Code	Place	Centre Code	Place	Centre Code	Place
1	Ahmadabad	21	Kurnool	41	Thanjavur
2	Anantapur	22	Kolkata	42	Thrissur
3	Bangalore	23	Kottayam	43	Tirunelveli
4	Bhopal	24	Lucknow	44	Tirupur
5	Bhubaneswar	25	Madurai	45	Trichy
6	Calicut	26	Mettupalayam	46	Trivandrum
7	Chengalpet	27	Mumbai	47	Tuticorin
8	Chennai (Broadway)	28	Nagercoil	48	Vadodara
9	Chennai (Chetpet)	29	Ongole	49	Vellore
10	Cochin	30	Ooty	50	Vijayawada
11	Coimbatore City	31	Palakkad	51	Virudhunagar
12	Coimbatore - Karunya Nagar	32	Pathanamthitta	52	Vizag
13	Cuddappah	33	Patna	53	Warangal
14	Delhi	34	Pollachi		
15	Dindigul	35	Pondicherry		
16	Guntur	36	Pune		
17	Guwahati	37	Raipur		
18	Hyderabad	38	Rajamundry		
19	Jamshedpur	39	Ranchi		
20	Karaikudi	40	Salem		



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SYLLABUS FOR KARUNYA ENTRANCE EXAMINATION - 2019 (KEE-2019)

MATHEMATICS - KEE 2019

Applications of Matrices and Determinants:

Adjoint, inverse – properties, computation of inverses, solution of system of linear equations by matrix inversion method. Rank of a matrix – elementary transformation on a matrix, Cramer's rule, non-homogeneous equations, homogeneous linear system and rank method.

Complex Numbers:

Complex number system - conjugate, properties, ordered pair representation. Modulus – Properties, geometrical representation, polar form, principal value, conjugate, sum, difference, product, quotient, vector interpretation, solutions of polynomial equations, De Moivre's theorem and its applications. Roots of a complex number – n^{th} roots, cube roots, fourth roots.

Analytical Geometry of two dimensions:

Definition of a conic – general equation of a conic, classification with respect to the general equation of a conic, classification of conics with respect to eccentricity. Equations of conic sections (parabola, ellipse and hyperbola) in standard forms and general forms- Directrix, Focus and Latus rectum - parametric form of conics and chords. – Tangents and normals – cartesian form and parametric form- equation of chord of contact of tangents from a point (x_1, y_1) to all the above said curves. Asymptotes, Rectangular hyperbola – Standard equation of a rectangular hyperbola.

Vector Algebra:

Scalar Product – angle between two vectors, properties of scalar product and applications of dot products. Vector product right handed and left handed systems, properties of vector product and applications of cross product - Product of three vectors – Scalar triple product, properties of scalar triple product, vector triple Product.

Differential Calculus:

Derivative as a rate measurer - rate of change, velocity, acceleration, related rates, derivative as a measure of slope, tangent, normal and angle between curves, maxima and minima. Mean value theorem - Rolle's Theorem, Lagrange Mean Value Theorem, Taylor's and Maclaurin's series, L'Hospital's Rule, stationary points, increasing, decreasing, maxima, minima, concavity, convexity and points of inflexion.

Integral Calculus and its Applications:

Simple definite integrals – fundamental theorems of calculus, properties of definite integrals. Reduction formulae – reduction formulae for $\int \sin nx \, dx$ and $\int \cos nx \, dx$, Bernoulli's formula. Area of bounded regions, length of the curve.

Differential Equations:

Differential equations - formation of differential equations, order and degree, solving differential equations (1st order), variables separable, homogeneous and linear equations. Second order linear differential equations - second order linear differential equations with constant co-efficients, finding the particular integral if $f(x) = e^{mx}$, $\sin mx$, $\cos mx$, x , x^2 .

Probability Distributions:

Probability – Axioms – Addition law - Conditional probability – Multiplicative law - Baye's Theorem - Random variable - probability density function, distribution function, mathematical expectation, variance Theoretical distributions - discrete distributions, Binomial, Poisson distributions- Continuous distributions, Normal distribution.

Discrete Mathematics:

Mathematical logic – logical statements, connectives, truth tables, logical equivalence, tautology.

Groups:

Binary operations, semigroups, monoids, groups, order of a group, order of an element, properties of groups.



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PHYSICS - KEE 2019

Electrostatics:

Frictional electricity – Charges and their conservation – Coulomb's law – Forces between two point electric charges – Superposition principle

Electric field – Electric field due to a point charge – Electric field lines – Electric dipole – Electric field intensity due to a dipole (on its axial line and on the equatorial line) – Behaviour of dipole in a uniform electric field – Application of electric dipole in microwave oven

Electric potential – Potential difference – Electric Potential due to a point charge and due to a dipole – Equipotential surfaces – Electrical potential energy of a system of two point charges

Electric flux – Gauss's theorem – Field due to infinitely long straight wire – Field due to uniformly charged infinitely plane sheet – Field due to two parallel sheets – Field due to uniformly charged thin spherical shell (inside and outside)

Electrostatic induction – Capacitor and capacitance – Dielectric and electric polarization – Parallel plate capacitor with and without dielectric medium – Applications of a capacitor – Energy stored in a capacitor – Capacitors in series and in parallel – Action of points – Lightning arrester – Van de Graaff generator

Current Electricity:

Electric current – Flow of charges in a metallic conductor – Drift velocity and mobility – Their relation with electric current

Ohm's law – Electrical resistance – V-I characteristics – Electrical resistivity and conductivity – Classification of materials in terms of conductivity – Superconductivity – Elementary ideas – Carbon resistors – Colour code for carbon resistors – Combination of resistors – Series and parallel – Temperature dependence of resistance – Internal resistance of a cell – Potential difference and emf of a cell

Kirchoff's law – Illustration by simple circuits – Wheatstone's bridge and its applications for temperature coefficient of resistance measurement – Meterbridge – Special case of Wheatstone bridge – Potentiometer – Principle – Comparing the emf of two cells

Electric power – Chemical effect of current – Electro chemical cells – Primary (Voltaic, Lechlanche, and Daniel cells) – Secondary – Rechargeable cell – Lead acid accumulator

Effects of Electric Current:

Heating effect – Joule's law – Experimental verification – Thermoelectric effects – Seeback effect – Peltier effect – Thomson effect – Thermocouple, thermo emf, neutral and inversion temperature – Thermopile

Magnetic effect of electric current – Concept of magnetic field – Oersted's experiment – Biot-Savart law – Magnetic field due to an infinitely long current carrying straight wire and circular

coil – Tangent galvanometer – Construction and working – Bar magnet as an equivalent solenoid – Magnetic field lines

Ampere's circuital law and its application to solenoid

Force on a moving charge in uniform magnetic field and electric field – Cyclotron – Force on current carrying conductor in a uniform magnetic field – Forces between two parallel current carrying conductors – Definition of ampere

Torque experienced by a current loop in a uniform magnetic field – Moving coil galvanometer – Conversion to ammeter and voltmeter – Current loop as a magnetic dipole and its magnetic dipole moment – Magnetic dipole moment of a revolving electron

Electromagnetic Induction and Alternating Current:

Electromagnetic induction – Faraday's law – Induced emf and current – Lenz's law

Self induction – Mutual induction – Self inductance of a long solenoid – Mutual inductance of two long solenoids

Methods of inducing emf – (1) By changing magnetic induction (2) By changing area enclosed by the coil and (3) By changing the orientation of the coil (quantitative treatment)

AC generator – Commercial generator (Single phase, three phase)

Eddy current – Applications – Transformer – Long distance transmission

Alternating current – Measurement of AC – AC circuit with resistance – AC circuit with inductor – AC circuit with capacitor – LCR series circuit – Resonance and Q-factor: power in AC circuits

Electromagnetic Waves and Wave Optics:

Electromagnetic waves and their characteristics – Electromagnetic spectrum, Radio, microwaves, Infra red, visible, ultra violet – X rays, gamma rays – Propagation of electromagnetic waves

Emission and Absorption spectrum – Line, Band and continuous spectra – Fluorescence and phosphorescence

Theories of light – Corpuscular – Wave – Electromagnetic and Quantum theories

Scattering of light – Rayleigh's scattering – Tyndal scattering – Raman Effect – Raman spectrum – Blue colour of the sky and reddish appearance of the sun at sunrise and sunset

Wave front and Huygens's principle – Reflection, Total internal reflection and refraction of plane wave at a plane surface using wave fronts.

Interference – Young's double slit experiment and expression for fringe width – Coherent source - Interference of light – Formation of colours in thin films – Analytical treatment – Newton's rings

Diffraction – Differences between interference and diffraction of light – Diffraction grating

Polarization of light waves – Polarization by reflection – Brewster's law – Double refraction – Nicol prism – Uses of plane polarised light and polaroids – Rotatory polarization – Polarimeter

Atomic Physics:

Atomic structure – Discovery of the electron – Specific charge (Thomson's method) and charge of the electron (Millikan's oil drop method) – alpha scattering – Rutherford's atom model

Bohr's model – Energy quantization – Energy and wave number expression – Hydrogen spectrum – energy level diagrams – Sodium and mercury spectra - Excitation and ionization potentials

Sommerfeld's atom model – X rays – Production, properties, detection, absorption, diffraction of X-rays – Laue's experiment – Bragg's law – Bragg's X-ray spectrometer – X-ray spectra – Continuous and characteristic X-ray spectrum – Mosley's law and atomic number
Masers and Lasers – Spontaneous and stimulated emission – Normal population and population inversion – Ruby laser – He-Ne laser – properties and applications of laser light – holography

Dual Nature of Radiation and Matter – Relativity:

Photoelectric effect – Light waves and photons – Einstein's photoelectric equation – Laws of photoelectric emission – Particle nature of energy – Photoelectric equation – Work function – Photo cells and their application

Matter waves – Wave mechanical concept of the atom – Wave nature of particles – de Broglie relation – de Broglie wave length of an electron – Electron microscope

Concept of space, mass, time – Frame of references – Special theory of relativity – Relativity of length, time and mass with velocity – ($E = mc^2$)

Nuclear physics

Nuclear properties – Nuclear Radii, masses, binding energy, density, charge – Isotopes, isobars and isotones – Nuclear mass defect – Binding energy – Stability of nuclei – Bain bridge mass spectrometer

Nature of nuclear forces – Neutron – Discovery – Properties – Artificial transmutation – Particle accelerator

Radioactivity – Alpha, beta and gamma radiations and their properties, α -decay, β -decay and γ -decay – Radioactive decay law – Half life – Mean life – Artificial radioactivity – Radio isotopes – Effects and uses Geiger-Muller counter

Radio carbon dating – Biological radiation hazards

Nuclear fission – Chain reaction – Atom bomb – Nuclear reactor – Nuclear fusion – Hydrogen bomb – Cosmic rays – Elementary particles

Semiconductor Devices and their Applications:

Semiconductor theory – Energy band in solids – Difference between metals, insulators and semiconductors based on band theory – Semiconductor doping – Intrinsic and Extrinsic semiconductors

Formation of P-N Junction – Barrier potential and depletion layer – P-N Junction diode – Forward and reverse bias characteristics – Diode as a rectifier – Zener diode – Zener diode as a voltage regulator – LED

Junction transistors – Characteristics – Transistor as a switch – Transistor as an amplifier – Transistor biasing – RC, LC coupled and direct coupling in amplifier – Feedback amplifier – Positive and negative feedback – Advantages of negative feedback amplifier – Oscillator – Condition for oscillations – LC circuit – Colpitt oscillator

Logic gates – NOT, OR, AND, EXOR using discrete components – NAND and NOR gates as universal gates – Integrated Circuits

Laws and theorems of Boolean's algebra – Operational amplifier – Parameters – Pin-out configuration – Basic applications – Inverting amplifier – Non-inverting amplifier – Summing and difference amplifiers

Measuring Instruments – Cathode Ray oscilloscope – Principle – Functional units – Uses – Multimeter – construction and uses

Communication Systems:

Modes of propagation, ground wave – Sky wave propagation

Amplitude modulation, merits and demerits – Applications – Frequency modulation –

Advantages and applications – Phase modulation

Antennas and directivity

Radio transmission and reception – AM and FM – Super heterodyne receiver

T.V. transmission and reception – Scanning and synchronizing

Vidicon (camera tube) and picture tube – Block diagram of a monochrome TV transmitter and receiver circuits

Radar – Principle – Applications

Digital communication – Data transmission and reception – Principles of fax, modem, satellite communication – Wire, cable and Fibre-optical communication



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CHEMISTRY - KEE 2019

Atomic Structure:

Bohr's atomic model – limitations – Sommerfeld's theory of atomic structure; Electronic configuration and Quantum numbers; Shapes of s, p, d, f orbitals – Pauli's exclusion principle - Hund's Rule of maximum multiplicity – Aufbau principle of filling up of electrons in orbitals. Hydrogen spectrum – Lyman, Balmer, Paschen, Brakett and Pfund series; deBroglie's theory; Heisenberg's uncertainty principle – wave nature of electron – Schrodinger wave equation and its significance – Eigen values and Eigen functions. Hybridization of atomic orbitals to form molecular orbitals.

p, d and f – Block Elements:

p block elements – Phosphorous compounds; PCl_3 , PCl_5 – Oxides. Hydrogen halides, Inter-halogen compounds. Xenon fluorides. General Characteristics of d–block elements – Electronic Configuration – Oxidation states of first row transition elements and their colours; Lanthanides – Introduction, Electronic configuration, general characteristics, oxidation state – lanthanide contraction.

Coordination Chemistry and Solid State Chemistry

Terminology in coordination chemistry – IUPAC nomenclature of mononuclear coordination compounds – Isomerism, Geometrical isomerism in 4-coordinate, 6-coordinate complexes. Werner's theory of co-ordination, Valence Bond theory. Uses of coordination compounds. Bioinorganic compounds (Haemoglobin and chlorophyll). Lattice – unit cell, systems, types of crystals, packing in solids; Ionic crystals – Imperfections in solids – point defects. X-Ray diffraction

Thermodynamics, Chemical Equilibrium and Chemical Kinetics

First and second law of thermodynamics – spontaneous and non spontaneous processes, entropy, Gibb's free energy – Free energy change and chemical equilibrium – significance of entropy. Law of mass action – Le Chatlier's principle, applications of chemical equilibrium. Rate expression, order and molecularity of reactions, zero order, first order and pseudo first order reaction – half life period. Determination of rate constant and order of reaction. Temperature dependence of rate constant – Arrhenius equation, activation energy

Electrochemistry

Theory of electrical conductance; metallic and electrolytic conductance. Faraday's laws – theory of strong electrolytes – Specific resistance, specific conductance, equivalent and molar conductance – Variation of conductance with dilution – Kohlraush's law – Ionic product of

water, pH and pOH – buffer solutions – use of pH values. Cells – Electrodes and electrode potentials – construction of cell and EMF values, Fuel cells, Corrosion and its prevention.

Isomerism in Organic Compounds

Definition, Classification – structural isomerism, stereo isomerism – geometrical and optical isomerism. Optical activity – chirality – compounds containing chiral centres – R,S notation, D,L notation.

Alcohols and Ethers

Nomenclature of alcohols – Classification of alcohols - distinction between primary, secondary, and tertiary alcohols – General methods of preparation of primary alcohols, properties. Aromatic alcohols – preparation and properties of phenols and benzyl alcohol. Ethers – properties of aliphatic ethers – Uses. Aromatic ethers – Preparation of Anisole – Uses.

Carbonyl Compounds

Nomenclature of carbonyl compounds – Comparison of aldehydes and ketones. General methods of preparation of aldehydes – Properties – Uses. Aromatic aldehydes – Preparation of benzaldehyde – Properties and Uses. Aromatic ketones – preparation of acetophenone – Properties – Uses, preparation of benzophenone – Properties. Name reactions; Clemmenson reduction, Wolff – Kishner reduction, Cannizzaro reaction, Claisen Schmidt reaction, Benzoin Condensation, aldol Condensation. Preparation and applications of Grignard reagents.

Carboxylic Acids and their derivatives

Nomenclature – Preparation of aliphatic monocarboxylic acids – formic acid – Properties – Uses. Aromatic acids; Benzoic and Salicylic acid – Properties – Uses. Derivatives of carboxylic acids; acetyl chloride (CH_3COCl) – Preparation – Properties – Uses. Preparation of acetamide, Properties – acetic anhydride – preparation, Properties. Preparation of esters – methyl acetate – Properties.

Organic Nitrogen Compounds

Aliphatic nitro compounds – Preparation of aliphatic nitroalkanes – Properties – Uses. Aromatic nitro compounds – Preparation – Properties – Uses. Distinction between aliphatic and aromatic nitro compounds. Amines; aliphatic amines – General methods of preparation – Properties – Distinction between primary, secondary, and tertiary amines. Aromatic amines – Synthesis of benzylamine – Properties, Aniline – Preparation – Properties – Uses. Distinction between aliphatic and aromatic amine. Aliphatic nitriles – Preparation – properties – Uses. Diazonium salts – Preparation of benzene diazonium chloride

Biomolecules

Carbohydrates – distinction between sugars and non sugars, structural formulae of glucose, fructose and sucrose, with their linkages, invert sugar – definition, examples of oligo and polysaccharides,

Amino acids – classification with examples, Peptides – properties of peptide bond.



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BIOLOGY - KEE 2019

BOTANY

Cell Biology & Genetics: Cell- Structure and Organelles- Chromosomes : Structure and Types- Genes and Genome- Linkage and Crossing over - Gene Mapping- Recombination of Chromosomes- Mutation- Chromosomal aberrations- DNA as Genetic Material : Structure of DNA, Replication of DNA -Structure of RNA and its types

Biotechnology: Recombinant DNA Technology -Transgenic Plants and Microbes - Plant Tissue Culture and its Applications -Protoplast fusion -SCP

Plant physiology: Photosynthesis: Significance, Site of Photosynthesis, Photochemical and Biosynthetic phases, Electron Transport System, Photophosphorylation, C₃ and C₄ pathways, Photorespiration, Photosynthesis, Mode of Nutrition: Autotrophic, Heterotrophic, Chemosynthesis Respiration: Mechanism, Glycolysis, Krebs cycle, Pentose Pathway, Anaerobic Respiration, Fermentation, Plant Growth: Regulators, Phytohormones- Auxins, Gibberellins, Cytokinins

Biology in human welfare: Food production, Breeding Experiments, Improved Varieties, Role of Biofertilizers -Crop diseases and their control Biopesticides -Genetically Modified Food - Bio-War -Bio-Piracy - Bio-Patent - Medicinal plants and Microbes –Economic Importance: Food yielding (Rice), Oil yielding (Groundnut), Fiber Yielding (Cotton), Timber yielding (Teak)

ZOOLOGY

Human physiology: Nutrition –Carbohydrates- Proteins -Lipids –Vitamins-Minerals –Water-Balanced diet- Calorie values -Hyperglycemia, Hypoglycemia, Diabetes mellitus - Malnutritious - Digestion - Enzymes and enzyme action. Brief account of following: Dental caries - Root canal therapy, Liver cirrhosis, Hepatitis, Respiration: Process of pulmonary respiration, Breathing exercises - Yoga, Functioning of heart, Myocardial infarction, Angiogram– Heart attack - ECG, Blood pressure, Heart transplantation, Blood components – Functions, Plasma, Corpuscles Blood clotting - Anticoagulants – Thrombosis, Embolism, Blood donation, Blood banks Brain - Functioning of different regions, Spinal cord – Functioning, Pituitary and Thyroid, Parathyroidal hormones, Insulin, Hormones of Adrenal cortex and Medulla, Reproductive Hormones, Eye-

Focusing Mechanism & Photo chemistry of retina, Eye infections, Ear, Skin- Melanin – Functions, Tongue, Urea Biosynthesis, Reproductive system, Brief account of spermatogenesis- Oogenesis - Menstrual cycle, Invitro fertilization, Birth control

Microbiology: Introduction, History of Medical Microbiology, Pasteur, Koch and Lister Virology - Structure, Genetics, Culture and diseases, AIDS and its control, Bacteriology - Structure, Genetics and diseases. Protozoan microbiology - Disease related, Larval microbiology - Disease oriented Pathogenecity of Microorganism

Immunity: Immune system: Innate immunity, Acquired immunity – Humoral, Innate immunity, Lymphoid cells, Mono nuclear phagocytes, Poly morphonuclear phagocytes, Cytokines, Structure of Antibody (Ig), Antigen – antibody Reactions, Acquired immunity, Development of immune system, T-cell activation, Monoclonal antibodies, Cytotoxicity, Immunology of Tissue Transplantation, Immune deficiency diseases

Modern genetics: Human Genetics- Karyotyping, Chromosome gene mapping, Recombinant DNA technology and segmenting, Genetic diseases, Human Genome project, Cloning, Transgenic organisms – Genetically Modified Organisms (GMO), Gene therapy, Bioinformatics – application, DNA sequencing and protein sequencing and Protein structure

Environmental science: Human population and explosion – Issues Global warming - Crisis – Green House effect, Ozone layer depletion, Waste management, Biodiversity conservation, Poverty and environment, Fresh water crisis and management

Applied biology: Livestock and Management, Dairy Breeds of cattle, Milch breed, Exotic and cross breeds, Techniques adapted in cattle breeding, Poultry – Farming techniques, Fish farming, Edible fishes of Tamilnadu, Medical Lab – Techniques- Sphygmomonometer, Heamocytometer, Urine – Sugar analysis, CT Scan, Endoscopic techniques, Artificial pacemaker

Theories and evolution : Lamarckism, Neolamarckism, Darwinism, Neo Darwinism / Modern Concept of Natural selection, Species concept, Origin of species and Isolating, Mechanisms