



**MARATHANASIOS COLLEGE FOR ADVANCED STUDIES
TIRUVALLA (MACFAST)**

Thiruvalla – 689101

Report on Competitive Examination

UGC/CSIR- NET/ DBT/ ARS-NET coaching classes has been organized by School of Biosciences for giving guidance and encouragement for students having aspirations in the field of higher education where candidates are ranked according to their grades and then top rankers are selected. Clearing a competitive exam is a prerequisite for getting a job in a prestigious institute. This section aims to give our students awareness about different national level competitive exams. They are also trained to get through these exams.

The main objective behind the coaching classes was to know the pattern of various examinations and to get information about the exams conducted for the entry into jobs. Classes were conducted on scheduled basis ie, 20hrs by corresponding faculty. All important topics were covered in a crash course manner. Coaching sessions mainly dealt with paper II, with an aim to improve the knowledge of students in their subject areas. The students were given awareness on the need to analyse and understanding the application of concept and were guided with some shortcut methods to solve the questions quickly.

The section was handled by Dr. Treasa Varghese, Assistant Professor., School of Biosciences. In addition, every faculty ensured to discuss some previous years question from the portions that are being covered during the normal class hours on each day. These discussions were found to be very useful for students. National Eligibility Test (NET) was introduced by the University Grant Commission for bringing uniformity in the qualification of college teachers and research students. National Eligibility Test is generally conducted twice a year in the month of June and December. Through these coaching classes students had a clear idea on the Examination Pattern.

**List of students qualified in competitive examinations during the last five years
(CSIR-NET/ARS-NET/GATE)**

Sl.No.	Names of students selected/ qualified	Registration number/roll number for the exam	NET/JRF/GATE
Year 2020-2021			
1	Haritha K	XL21S61327024	GATE
Year 2019-2020			
1	Aleena Sara Mathew	KL01000289	ARS-NET
2	Anjali R	KL01000290	ARS-NET
3	Silpa Mary John	KL01000269	ARS-NET
4	Jobin S	KL17000411	ARS-NET
5	Rakhith R	KL17000339	ARS-NET
6	Ashifa N	BT20S37223011	GATE
7	Athira P Anil	BT20S37217120	GATE
8	Veena C Nair	XL20S37225054	GATE
9	Rixon Raj	KK1416200812	CSIR-UGC NET
10	Ajmal Kallar Moidu	KL 105200698	UGC-NET
Year 2018-2019			
1.	Neha Lukose	XL19S27044024	GATE
Year 2017-2018			
1.	Rixon Raj	XL18S17072040	GATE
2.	Rixon Raj	1020701896	ICAR-NET
3.	Rixon Raj	1061831207	CSIR-UGC NET&JRF
Year 2016-2017			
1.	Rixon Raj	2020700493	ARS-NET
2.	Rixon Raj	359479	CSIR-UGC NET



MACFAST
the trendsetter in education

**MAR ATHANASIOS COLLEGE FOR
ADVANCED STUDIES TIRUVALLA**
ACCREDITED BY NAAC WITH 'A' GRADE
RECOGNIZED BY DSIR, GOVT. OF INDIA

NOTICE

COACHING OF COMPETITIVE EXAMINATIONS

Dear Students,

The School of Biosciences is organizing coaching classes for NET/GATE/ARS from 04-01-2020 to 15-02-2020. The class is one hour from 3pm to 4pm. Those who are interested to join the class can inform the faculty-in-charge (Dr. Treesa Varghese) on or before 04-01-2020. The classes are engaged by Ms. Elma Susan Thomas, Guest faculty, School of Biosciences.

Date:01-01-2020

Dr. Treesa Varghese

Faculty-in-charge



for
Head, School of Bio Sciences
Mar Athanasios College for Advanced Studies
(MACFAST)
Tiruvalla-689 101
India

A Minority Institution of the
Corporate Educational Agency of the
Catholic Archdiocese of Tiruvalla

Courses @
Main Campus
MBA & MCA

Courses @ Bio campus
M.Sc Biochemistry, M.Sc Biotechnology
M.Sc Bioinformatics, M.Sc Plant Biotechnology
M.Sc Food Technology & Quality Assurance
M.Sc Phytomedicine Science & Technology

E-mail
principal@macfast.org
macfast@macfast.org

Website
www.macfast.org
www.macfast.in

Details of Coaching given for NET/GATE/ARS

Training was given for NET/GATE/ARS during January 2021 to February 2021.
The training was for 7 days the faculty in charge for the programme was Dr.
Treesa Varghese

Student enrollment details

<u>Training for competitive examinations</u>								
<u>2020-2021</u>								
	Name of student	04-01-2020	11-01-2020	18-01-2020	25-01-2020	01-02-2020	08-02-2020	15-02-2020
1	Mejo George	✓	✓	✓	✓	✓	✓	✓
2	Devika B	✓	✓	✓	✓	✓	✓	✓
3	Freedia Sebastian	✓	✓	✓	✓	✓	✓	✓
4	Jayalakshmi T L	✓	✓	✓	✓	✓	✓	✓
5	Anjali T	✓	✓	✓	✓	✓	✓	✓
6	Salomy K S	✓	✓	✓	✓	✓	✓	✓
7	Parvathi Suresh	✓	✓	✓	✓	✓	✓	✓
8	Akshaya P.T	✓	✓	✓	✓	✓	✓	✓
9	Abiya Ann Mathew	✓	✓	✓	✓	✓	✓	✓
10	Theresa George	✓	✓	✓	✓	✓	✓	✓
11	Aparna Tom	✓	✓	✓	✓	✓	✓	✓
12	Parvathy U R	✓	✓	✓	✓	✓	✓	✓
13	Anju Alexander	✓	✓	✓	✓	✓	✓	✓
14	Anulekshmi	✓	✓	✓	✓	✓	✓	✓
15	Ardra A.P	✓	✓	✓	✓	✓	✓	✓
16	Anjali Murali	✓	✓	✓	✓	✓	✓	✓
17	Haritha M A	✓	✓	✓	✓	✓	✓	✓
18	Fathima Salim	✓	✓	✓	✓	✓	✓	✓

Teacher in-charge
Dr. Treesa Varghese




**CSIR-UGC National Eligibility Test (NET) for Junior Research Fellowship
and Lecturer-ship**

LIFE SCIENCES

1. Molecules and their Interaction Relevant to Biology
2. Cellular Organization
3. Fundamental Processes
4. Cell Communication and Cell Signaling
5. Developmental Biology
6. System Physiology – Plant
7. System Physiology – Animal
8. Inheritance Biology
9. Diversity of Life Forms
10. Ecological Principles
11. Evolution and Behavior
12. Applied Biology
13. Methods in Biology



for 
Head, School of Bio Sciences
Mar Athanasios College for Advanced Studies
(MACFAST)
Tiruvalla-689 101
Kerala, India

1. MOLECULES AND THEIR INTERACTION RELEVANT TO BIOLOGY

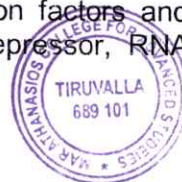
- A. Structure of atoms, molecules and chemical bonds.
- B. Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins).
- C. Stabilizing interactions (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.).
- D. Principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics, colligative properties).
- E. Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers.
- F. Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes
- G. Conformation of proteins (Ramachandran plot, secondary structure, domains, motif and folds).
- H. Conformation of nucleic acids (helix (A, B, Z), t-RNA, micro-RNA).
- I. Stability of proteins and nucleic acids.
- J. Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.

2. CELLULAR ORGANIZATION

- A) **Membrane structure and function**
(Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, membrane pumps, mechanism of sorting and regulation of intracellular transport, electrical properties of membranes).
- B) **Structural organization and function of intracellular organelles** (Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast, structure & function of cytoskeleton and its role in motility).
- C) **Organization of genes and chromosomes** (Operon, unique and repetitive DNA, interrupted genes, gene families, structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons).
- D) **Cell division and cell cycle** (Mitosis and meiosis, their regulation, steps in cell cycle, regulation and control of cell cycle).
- E) **Microbial Physiology** (Growth yield and characteristics, strategies of cell division, stress response)

3. FUNDAMENTAL PROCESSES

- A) **DNA replication, repair and recombination** (Unit of replication, enzymes involved, replication origin and replication fork, fidelity of replication, extrachromosomal replicons, DNA damage and repair mechanisms, homologous and site-specific recombination).
- B) **RNA synthesis and processing** (transcription factors and machinery, formation of initiation complex, transcription activator and repressor, RNA polymerases, capping,



elongation, and termination, RNA processing, RNA editing, splicing, and polyadenylation, structure and function of different types of RNA, RNA transport).

- C) **Protein synthesis and processing** (Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, and translational proof-reading, translational inhibitors, Post- translational modification of proteins).
- D) **Control of gene expression at transcription and translation level** (regulating the expression of phages, viruses, prokaryotic and eukaryotic genes, role of chromatin in gene expression and gene silencing).

4. Cell communication and cell signaling

- A) **Host parasite interaction** Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells, alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.
- B) **Cell signaling** Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways, bacterial and plant two-component systems, light signaling in plants, bacterial chemotaxis and quorum sensing.
- C) **Cellular communication** Regulation of hematopoiesis, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation.
- D) **Cancer**
Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.
- E) **Innate and adaptive immune system** Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity. B and T cell epitopes, structure and function of antibody molecules. generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen-antibody interactions, MHC molecules, antigen processing and presentation, activation and differentiation of B and T cells, B and T cell receptors, humoral and cell-mediated immune responses, primary and secondary immune modulation, the complement system, Toll-like receptors, cell-mediated effector functions, inflammation, hypersensitivity and autoimmunity, immune response during bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections, congenital and acquired immunodeficiencies, vaccines.



5. DEVELOPMENTAL BIOLOGY

A) Basic concepts of development : Potency, commitment, specification, induction, competence, determination and differentiation; morphogenetic gradients; cell fate and cell lineages; stem cells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development

B) Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination.

C) Morphogenesis and organogenesis in animals : Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis – vulva formation in *Caenorhabditis elegans*, eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development- larval formation, metamorphosis; environmental regulation of normal development; sex determination.

D) Morphogenesis and organogenesis in plants: Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum*

E) Programmed cell death, aging and senescence

6. SYSTEM PHYSIOLOGY - PLANT

A. Photosynthesis - Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO₂ fixation-C₃, C₄ and CAM pathways.

B. Respiration and photorespiration – Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway.

C. Nitrogen metabolism - Nitrate and ammonium assimilation; amino acid biosynthesis.

D. Plant hormones – Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.

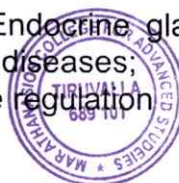
E. Sensory photobiology - Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins, stomatal movement; photoperiodism and biological clocks.



- F. **Solute transport and photoassimilate translocation** – uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates.
- G. **Secondary metabolites** - Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles.
- H. **Stress physiology** – Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses.

7. **SYSTEM PHYSIOLOGY - ANIMAL**

- A. **Blood and circulation** - Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, immunity, haemostasis.
- B. **Cardiovascular System:** Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above.
- C. **Respiratory system** - Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration.
- D. **Nervous system** - Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture.
- E. **Sense organs** - Vision, hearing and tactile response.
- F. **Excretory system** - Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance.
- G. **Thermoregulation** - Comfort zone, body temperature – physical, chemical, neural regulation, acclimatization.
- H. **Stress and adaptation**
- I. **Digestive system** - Digestion, absorption, energy balance, BMR.
- J. **Endocrinology and reproduction** - Endocrine glands, basic mechanism of hormone action, hormones and diseases; reproductive processes, gametogenesis, ovulation, neuroendocrine regulation



8. INHERITANCE BIOLOGY

- A) Mendelian principles :** Dominance, segregation, independent assortment.
- B) Concept of gene :** Allele, multiple alleles, pseudoallele, complementation tests
- C) Extensions of Mendelian principles :** Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters.
- D) Gene mapping methods :** Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.
- E) Extra chromosomal inheritance :** Inheritance of Mitochondrial and chloroplast genes, maternal inheritance.
- F) Microbial genetics :** Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.
- G) Human genetics :** Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.
- H) Quantitative genetics :** Polygenic inheritance, heritability and its measurements, QTL mapping.
- I) Mutation :** Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis.
- J) Structural and numerical alterations of chromosomes :** Deletion, duplication, inversion, translocation, ploidy and their genetic implications.
- K) Recombination :** Homologous and non-homologous recombination including transposition.

9. DIVERSITY OF LIFE FORMS:

A. Principles & methods of taxonomy:

Concepts of species and hierarchical taxa, biological nomenclature, classical & quantitative methods of taxonomy of plants, animals and microorganisms.

B. Levels of structural organization:

Unicellular, colonial and multicellular forms. Levels of organization of tissues, organs & systems. Comparative anatomy, adaptive radiation, adaptive modifications.



- C. **Outline classification of plants, animals & microorganisms:**
Important criteria used for classification in each taxon. Classification of plants, animals and microorganisms. Evolutionary relationships among taxa.
- D. **Natural history of Indian subcontinent:**
Major habitat types of the subcontinent, geographic origins and migrations of species. Common Indian mammals, birds. Seasonality and phenology of the subcontinent.
- E. **Organisms of health & agricultural importance:**
Common parasites and pathogens of humans, domestic animals and crops.
- F. **Organisms of conservation concern:**
Rare, endangered species. Conservation strategies.

10. ECOLOGICAL PRINCIPLES

The Environment: Physical environment; biotic environment; biotic and abiotic interactions.

Habitat and Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.

Population Ecology: Characteristics of a population; population growth curves; population regulation; life history strategies (r and K selection); concept of metapopulation – demes and dispersal, interdemec extinctions, age structured populations.

Species Interactions: Types of interactions, interspecific competition, herbivory, carnivory, pollination, symbiosis.

Community Ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones.

Ecological Succession: Types; mechanisms; changes involved in succession; concept of climax.

Ecosystem Ecology: Ecosystem structure; ecosystem function; energy flow and mineral cycling (C,N,P); primary production and decomposition; structure and function of some Indian ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, eustarine).

Biogeography: Major terrestrial biomes; theory of island biogeography; biogeographical zones of India.



Applied Ecology: Environmental pollution; global environmental change; biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches.

Conservation Biology: Principles of conservation, major approaches to management, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves).

11. EVOLUTION AND BEHAVIOUR

A. Emergence of evolutionary thoughts

Lamarck; Darwin—concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis.

B. Origin of cells and unicellular evolution:

Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiment of Miller (1953); The first cell; Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism.

C. Paleontology and Evolutionary History:

The evolutionary time scale; Eras, periods and epoch; Major events in the evolutionary time scale; Origins of unicellular and multi cellular organisms; Major groups of plants and animals; Stages in primate evolution including Homo.

D. Molecular Evolution:

Concepts of neutral evolution, molecular divergence and molecular clocks; Molecular tools in phylogeny, classification and identification; Protein and nucleotide sequence analysis; origin of new genes and proteins; Gene duplication and divergence.

E. The Mechanisms:

Population genetics – Populations, Gene pool, Gene frequency; Hardy-Weinberg Law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution.

F. Brain, Behavior and Evolution:

Approaches and methods in study of behavior; Proximate and ultimate causation; Altruism and evolution-Group selection, Kin selection, Reciprocal altruism; Neural basis



of learning, memory, cognition, sleep and arousal; Biological clocks; Development of behavior; Social communication; Social dominance; Use of space and territoriality; Mating systems, Parental investment and Reproductive success; Parental care; Aggressive behavior; Habitat selection and optimality in foraging; Migration, orientation and navigation; Domestication and behavioral changes.

12. **APPLIED BIOLOGY:**

- A. Microbial fermentation and production of small and macro molecules.
- B. Application of immunological principles, vaccines, diagnostics. Tissue and cell culture methods for plants and animals.
- C. Transgenic animals and plants, molecular approaches to diagnosis and strain identification.
- D. Genomics and its application to health and agriculture, including gene therapy.
- E. Bioresource and uses of biodiversity.
- F. Breeding in plants and animals, including marker – assisted selection
- G. Bioremediation and phytoremediation
- H. Biosensors



13. METHODS IN BIOLOGY

A. Molecular Biology and Recombinant DNA methods:

Isolation and purification of RNA, DNA (genomic and plasmid) and proteins, different separation methods.

Analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis, Isoelectric focusing gels.

Molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems.

Expression of recombinant proteins using bacterial, animal and plant vectors.

Isolation of specific nucleic acid sequences

Generation of genomic and cDNA libraries in plasmid, phage, cosmid, BAC and YAC vectors.

In vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms.

Protein sequencing methods, detection of post translation modification of proteins.

DNA sequencing methods, strategies for genome sequencing.

Methods for analysis of gene expression at RNA and protein level, large scale expression, such as micro array based techniques

Isolation, separation and analysis of carbohydrate and lipid molecules

RFLP, RAPD and AFLP techniques

B. Histochemical and Immunotechniques

Antibody generation, Detection of molecules using ELISA, RIA, western blot, immunoprecipitation, fluocytometry and immunofluorescence microscopy, detection of molecules in living cells, in situ localization by techniques such as FISH and GISH.

C. Biophysical Method:

Molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy Molecular structure determination using X-ray diffraction and NMR, Molecular analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods.

D. Statistcal Methods:

Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and normal); Sampling distribution; Difference between parametric and non-parametric statistics; Confidence Interval; Errors; Levels of significance; Regression and Correlation; t-test; Analysis of variance; X^2 test;; Basic introduction to Muetrovariate statistics, etc.



E. **Radiolabeling techniques:**

Detection and measurement of different types of radioisotopes normally used in biology, incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guidelines.

F. **Microscopic techniques:**

Visualization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etch and freeze-fracture methods for EM, image processing methods in microscopy.

G. **Electrophysiological methods:**

Single neuron recording, patch-clamp recording, ECG, Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI, fMRI, CAT.

H. **Methods in field biology:**

Methods of estimating population density of animals and plants, ranging patterns through direct, indirect and remote observations, sampling methods in the study of behavior, habitat characterization: ground and remote sensing methods..

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for
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(MACFAST)
Tiruvalla-689 101
Kerala India



GATE 2021 Scorecard

Graduate Aptitude Test in Engineering (GATE)



Candidate's Details

Name

MADHUSOODHANAN K

Parent's / Guardian's Name

XL21S61327024

21-Nov-1997

Registration Number

Date of Birth

Life Sciences (XL)

Examination Paper

Sections : Biochemistry (Q), Zoology (T)



(Candidate's Signature)

Performance

GATE Score

306

Number of Candidates
Appeared in this paper

23973

Marks out of 100*

33.33

All India Rank in this
paper

5207

Qualifying Marks**

36.0

32.4

24.0

General

EWS/OBC (NCL)

SC/ST/PwD

Valid up to 31st March 2024

* Normalized marks for Civil Engineering (CE), Computer Science and Information Technology (CS) and Mechanical Engineering (ME) Papers.

** A candidate is considered qualified if the marks secured are greater than or equal to the qualifying marks mentioned for the category for which valid category certificate, if applicable, is produced along with this scorecard.

Deepankar
19th March 2021

Prof. Deepankar Choudhury
Organising Chairperson, GATE 2021
(on behalf of NCB - GATE, for MoE)



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The GATE 2021 score is calculated using the formula

$$GATE\ Score = S_q + (S_t - S_q) \frac{(M - M_q)}{(\bar{M}_t - M_q)}$$

where,

M is the marks obtained by the candidate in the paper, mentioned on this GATE 2021 scorecard

M_q is the qualifying marks for general category candidate in the paper

\bar{M}_t is the mean of marks of top 0.1% or top 10 (whichever is larger) of the candidates who appeared in the paper (in case of multi-session papers including all sessions)

$S_q = 350$, is the score assigned to M_q

$S_t = 900$, is the score assigned to \bar{M}_t

In the GATE 2021 score formula, M_q is 25 marks (out of 100) or $\mu + \sigma$, whichever is greater. Here μ is the mean and σ is the standard deviation of marks of all the candidates who appeared in the paper.

Qualifying in GATE 2021 does not guarantee either an admission to a post-graduate program or a scholarship/assistantship. Admitting institutes may conduct further tests and interviews for final selection.

Codes for XE and XL Paper Sections (compulsory section and any other two sections)

XE: Engineering Sciences

- A – Engineering Mathematics (compulsory)
- B – Fluid Mechanics
- C – Materials Science
- D – Solid Mechanics
- E – Thermodynamics
- F – Polymer Science and Engineering
- G – Food Technology
- H – Atmospheric and Oceanic Sciences

XL: Life Sciences

- P – Chemistry (compulsory)
- Q – Biochemistry
- R – Botany
- S – Microbiology
- T – Zoology
- U – Food Technology

Graduate Aptitude Test in Engineering (GATE) 2021 was organized by Indian Institute of Technology Bombay on behalf of the National Coordination Board (NCB) - GATE for the Department of Higher Education, Ministry of Education (MoE), Government of India.

2019-2020



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NOTICE - COACHING FOR COMPETITIVE EXAMINATIONS

Dear Students,

School of Bioscience is organizing coaching classes for NET/GATE/ARS from 11-01-2019 to 10-05-2019, 3 pm to 4 pm, one class per week. Classes will be handled by Dr Treesa Varghese, Assistant Professor, School of Biosciences. Those students who are interested to join can inform to Dr Treesa Varghese before the starting date.

Date: 05-01-2019



Dr Treesa Varghese
Faculty-in charge

Training for competitive examinations

2019-2020

	Name of student	11-01-2019	08-03-2019	10-05-2019
1	Haritha K	✓	✓	✓
2	Megha Sunny	✓	✓	✓
3	Meghana Mariyam Cherian	✓	✓	✓
4	Veena C Nair	✓	✓	✓
5	Niya Benny	✓	✓	✓
6	Abhirami S	✓	✓	✓
7	Amala Antony	✓	✓	✓
8	Athira R Thankam	✓	✓	✓
9	Jenie Mary Varghese	✓	✓	✓
10	Amal Joseph Varghese	✓	✓	✓
11	Anisha Anto	✓	✓	✓
12	Staicy Treesa Tommy	✓	✓	✓
13	Vivek V Nair	✓	✓	✓
14	Akhil R Chandran	✓	✓	✓
15	Aneesha Susan Alexx	✓	✓	✓
16	Anjaly S Krishnan	✓	✓	✓
17	Chithra A M	✓	✓	✓
18	Ajith Pa	✓	✓	✓
19	Ajmal Kallar Moidu	✓	✓	✓
20	Akshaya C	✓	✓	✓
21	Aleena Sara Mathew	✓	✓	✓
22	Anjali R	✓	✓	✓
23	Gokul Shaji	✓	✓	✓
24	Gopika S Pillai	✓	✓	✓
25	Harikrishna	✓	✓	✓
26	Jobin S	✓	✓	✓
27	Joel Tom Jose	✓	✓	✓
28	Meera Ts	✓	✓	✓
29	Rakhith R	✓	✓	✓
30	Silpa Mary John	✓	✓	✓
31	Soumya Thomas	✓	✓	✓
32	Sreelekshmi S	✓	✓	✓
33	Merin Shaji	✓	✓	✓
34	Soorya Ramesh	✓	✓	✓

Teacher - in-charge

Dr. Treesa Varghese



**INDIAN COUNCIL OF AGRICULTURAL RESEARCH
KRISHI ANUSANDHAN BHAWAN-II, PUSA, NEW DELHI - 110 012**

RANK CARD

Roll Number: KL17000411



Category: OBC

Overall rank: 14

Category rank: OBC - 4

Name of the Candidate: JOBIN S

Father's Name: STERVIN C J

Subject for admission: Food Technology

Marks scored in AICE-JRF/SRF (Ph.D.)-2020 in the Subject: 184.54

Result: Eligible for Registration and Choice filling

(Controller of Examinations (Agril. Edn.))



**INDIAN COUNCIL OF AGRICULTURAL RESEARCH
KRISHI ANUSANDHAN BHAWAN-II, PUSA, NEW DELHI - 110 012**

RANK CARD

RollNumber: KL01000269



Category: GEN

Overall rank: 138

Name of the Candidate: SILPA MARY JOHN

Father's Name: JOHN KURIAN

Subject for admission: Food Technology

Marks scored in AICE-JRF/SRF (Ph.D.)-2020 in the Subject: 111.93

Result: Eligible for Registration and Choice filling

(Controller of Examinations (Agril. Edn.))



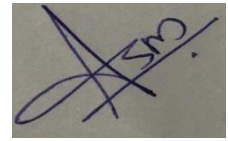
**INDIAN COUNCIL OF AGRICULTURAL RESEARCH
KRISHI ANUSANDHAN BHAWAN-II, PUSA, NEW DELHI - 110 012**

RANK CARD

RollNumber: KL01000289



Category: GEN



Overall rank: 130

Name of the Candidate: ALEENA SARA MATHEW

Father's Name: MATHEW P DANIEL

Subject for admission: Food Technology

Marks scored in AICE-JRF/SRF (Ph.D.)-2020 in the Subject: 114.96



Result: Eligible for Registration and Choice filling

(Controller of Examinations (Agril. Edn.))



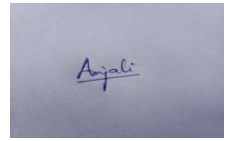
**INDIAN COUNCIL OF AGRICULTURAL RESEARCH
KRISHI ANUSANDHAN BHAWAN-II, PUSA, NEW DELHI - 110 012**

RANK CARD

RollNumber: KL01000290



Category: GEN



Overall rank: 225

Nameof the Candidate: ANJALI.R

Father's Name: RAJU

Subject for admission: Food Technology

Marks scored in AICE-JRF/SRF (Ph.D.)-2020 in the Subject: 63.53



Result: Eligible for Registration and Choice filling

(Controller of Examinations (Agril. Edn.))



**INDIAN COUNCIL OF AGRICULTURAL RESEARCH
KRISHI ANUSANDHAN BHAWAN-II, PUSA, NEW DELHI -**

RANK CARD

Roll Number: KL17000339

Category: GEN

Overall rank: 115

Name of the Candidate: RAKHITH R

Father's Name: RENJITH

Subject for admission: Food Technology

Marks scored in AICE-JRF/SRF (Ph.D.)-2020 in the Subject: 123.03

Result: Eligible for Registration and Choice filling



(Controller of Examinations (Agril.



GATE²⁰²⁰ Scorecard

Graduate Aptitude Test in Engineering

Name

VEENA C NAIR

Registration Number

XL20S37225054

Examination Paper

Life Sciences (XL)



Veena

(Candidate's Signature)

Sections : Botany (R)

Marks out of 100*

Microbiology (S)

All India Rank
in this paper

36.67

GATE Score

1701

March 18, 2020

Prof. B. R. Chahar

Qualified Chairman, GATE 2020
(on behalf of NCB – GATE, for MHRD)

Qualifying Marks**

GEN/EWS

OBC (NCL)

SC/ST/PwD

Number of Candidates

appeared in this paper

31.7

28.5

21.1

Valid from March 18, 2020 to March 17, 2023

* Normalized marks for Civil Engineering and Mechanical Engineering

** A candidate is considered qualified if the marks secured are greater than or equal to the qualifying marks mentioned for the category for which valid category certificate, if applicable, is produced along with this scorecard



Qualifying in GATE 2020 does not guarantee either an admission to a post-graduate programme or a scholarship/assistantship. Admitting institutes may conduct further tests or interviews for final selection.

In the GATE 2020, the qualifying marks for a general category candidate in each paper is $\mu + \sigma$ or 25 marks (out of 100), whichever is greater, where μ is the mean and σ is the standard deviation of marks of all the candidates who appeared in the paper. The qualifying marks for OBC(NCL) and SC/ST/PwD candidates are 90% and two-third of a general category candidate in the paper respectively.

74896f3b1cc7873207ec7877484f504f

The GATE 2020 score was calculated using the formula

$$GATE\ Score = S_q + (S_t - S_q) \frac{(M - M_q)}{(\bar{M}_t - M_q)}$$

where

M is marks (out of 100) obtained by the candidate in the paper

M_q is the qualifying marks for general category candidate in the paper

\bar{M}_t is the mean of marks of top 0.1% or top 10 (whichever is greater) of the candidates who appeared in the paper (in case of multi-session papers including all sessions)

$S_q = 350$, is the score assigned to M_q

$S_t = 900$, is the score assigned to \bar{M}_t

In multi-session (Civil Engineering and Mechanical Engineering) papers, the normalized mark of j^{th} candidate in the i^{th} session \hat{M}_{ij} was computed using the formula

$$\hat{M}_{ij} = \frac{\bar{M}_t^g - M_q^g}{\bar{M}_{ti} - M_{iq}} (M_{ij} - M_{iq}) + M_q^g$$

where

M_{ij} is the actual marks obtained by the j^{th} candidate in i^{th} session

\bar{M}_t^g is the average marks of the top 0.1% of the candidates considering all sessions

M_q^g is the sum of mean and standard deviation marks of the candidates in the paper considering all sessions

\bar{M}_{ti} is the average marks of the top 0.1% of the candidates in the i^{th} session

M_{iq} is the sum of the mean marks and standard deviation of the i^{th} session

Graduate Aptitude Test in Engineering (GATE) 2020 was organised by Indian Institute of Technology Delhi on behalf of the National Coordination Board (NCB) – GATE for the Department of Higher Education, Ministry of Human Resources Development (MHRD), Government of India.



NATIONAL TESTING AGENCY

Excellence in Assessment

E-certificate No.: DEC19C02755

University Grants Commission



ज्ञान-विज्ञान विमुक्तये

JOINT CSIR-UGC TEST



NATIONAL ELIGIBILITY TEST FOR ASSISTANT PROFESSOR

NTA Ref. No.: 191620052009

Roll No.: KK1416200812



Certified that RIXON RAJ

Son/Daughter of ROSAMMA RAJU

and RAJU E C

has qualified

the Joint CSIR-UGC Test for eligibility for Assistant Professor held on 15th December, 2019 in the subject
Life Sciences

As per information provided by the candidate, he/she had completed/appeared or was pursuing his/her Master's degree or equivalent examination in the related subject at the time of applying for Joint CSIR-UGC Test.

The date of eligibility for Assistant Professor is the date of declaration of Joint CSIR-UGC Test result, i.e., 23rd January, 2020, or the date of completion of Master's degree or equivalent examination with required percentage of marks within two years from the date of declaration of Joint CSIR-UGC Test result, i.e. by 22nd January, 2022, whichever is later.

This is an electronic certificate only, its authenticity and category in which the candidate had appeared should be verified from National Testing Agency (NTA) by the institution/appointing authority. This electronic certificate can also be verified by scanning the QR Code.

The validity of this electronic certificate is forever.

Subarashan

Senior Director, NTA

Date of issue: 20.07.2020

Note: NTA has issued the electronic certificate on the basis of information provided by the candidate in his/her online Application Form. The appointing authority should verify the original records/certificates of the candidate while considering him/her for appointment, as the NTA will not be liable for any false information provided by the candidate. The NTA is only responsible for the result which can be verified from the repository available in the website of NTA (csirnet.nta.nic.in). The candidate must fulfil the minimum eligibility conditions as laid down in the notification for Joint CSIR-UGC Test.



GATE 2020 Scorecard

Name

ASHIFA N

Registration Number

BT20S37223011

Examination Paper

Biotechnology (BT)



(Candidate's Signature)

Marks out of 100*

31

Qualifying Marks**

30.7

27.6

20.4

GEN/WS

OBC (NCL)

SC/ST/PwD

All India Rank
in this paper

1579

Number of Candidates
appeared in this paper

10313

GATE Score

354

Valid from March 18, 2020 to March 17, 2023

Qualified

March 18, 2020

Prof. B. R. Chahar

Organizing Chairman, GATE 2020
(on behalf of NCB - GATE, for MHRD)

* Normalized marks for Civil Engineering and Mechanical Engineering Papers

** A candidate is considered qualified if the marks secured are greater than or equal to the qualifying marks mentioned for the category for which valid category certificate, if applicable, is produced along with this scorecard



8850ed8d4f5c8ab59eca55ef137dc0d1

Qualifying in GATE 2020 does not guarantee either an admission to a post-graduate programme or a scholarship/assistantship. Admitting institutes may conduct further tests or interviews for final selection.

In the GATE 2020, the qualifying marks for a general category candidate in each paper is $\mu + \sigma$ or 25 marks (out of 100), whichever is greater, where μ is the mean and σ is the standard deviation of marks of all the candidates who appeared in the paper. The qualifying marks for OBC(NCL) and SC/ST/PwD candidates are 90% and two-third of a general category candidate in the paper respectively.

The GATE 2020 score was calculated using the formula

$$\text{GATE Score} = S_q + (S_t - S_q) \frac{(M - M_q)}{(M_t - M_q)}$$

where



M is marks (out of 100) obtained by the candidate in the paper

M_q is the qualifying marks for general category candidate in the paper

M_t is the mean of marks of top 0.1% or top 10 (whichever is greater) of the candidates who appeared in the paper (in case of

National Testing Agency (NTA)

UGC-NET RESULT December, 2019

Roll Number :	KL0105200698	Application Number :	190520624577		
Candidate's Name :	AJMAL KALLAR MOIDU				
Mother's Name :	SUHARA MOIDU				
Father's Name :	KALLAR MOIDU				
Category :	OBC- NCL (CENTRAL LIST)	Person with Disability(PwD)* :	No		
Subject :	HOME SCIENCE				
No of Candidates in this Subject	Registered :	16848	Appeared :		13614
Applied For :	JRF & ASSISTANT PROFESSOR				
Paper	Maximum Marks	Marks Obtained	Percentage of Marks Obtained	PercentileScore@	
Paper-1 :	100	52	52.00	88.0490671	
Paper-2 :	200	122	61.00	96.7680329	
Total :	300	174	58.00	95.1079771	
Marks obtained in words :	One Hundred Seventy Four Only				
Result :	QUALIFIED FOR ASSISTANT PROFESSOR ONLY				

‘*’ VI-Visually Impaired, HI- Hearing Impaired, LM-Locomotor Disability, OD- OtherDisability

‘@’ Percentile scores are scores based on the relative performance of all those who appearfor the examination in this subject.

Dated : 31.12.2019

Senior Director NTA UGC-NET

2018-2019



MAR ATHANASIOS COLLEGE FOR ADVANCED STUDIES TIRUVALLA
(MACFAST)

Thiruvalla - 689101

NOTICE - COACHING FOR COMPETITIVE EXAMINATIONS

Dear Students,

School of Bioscience is organizing coaching classes for NET/GATE/ARS from 12-01-2018 to 04-05-2018, 3 pm to 4 pm, one class per week. Classes will be handled by Ms Treesa Varghese, Assistant Professor, School of Biosciences. Those students who are interested to join can inform to Ms Treesa Varghese before the starting date.

Date: 08-01-2018



Ms Treesa Varghese
Faculty-in charge

Training for competitive examinations

2018-2019

	Name of student	12-01-2018	02-03-2018	04-05-2018
1	AKSHAY B .CHANDRAN	✓	✓	✓
2	ANJALI G	✓	✓	✓
3	NEENA KRISHNAN	✓	✓	✓
4	JEEBA S BABU	✓	✓	✓
5	ANEESHA S KUMAR	✓	✓	✓
6	AKSHAY B .CHANDRAN	✓	✓	✓
7	ANUPAMA I	✓	✓	✓
8	ASHIFA N	✓	✓	✓
9	DURGA VENUGOPAL	✓	✓	✓
10	RINEESH MILTON	✓	✓	✓
11	ATHIRA P ANIL	✓	✓	✓
12	RESHMA R	✓	✓	✓
13	LINUS ELIAS JOSE	✓	✓	✓
14	AJMI S	✓	✓	✓
15	APPUS MV	✓	✓	✓
16	ASWATHY A S	✓	✓	✓
17	JINSA SARA KURIAN	✓	✓	✓
18	JISHA GEORGE THYKKADAVIL	✓	✓	✓
19	KAMALAPRIYA M	✓	✓	✓
20	NEHA LUKOSE	✓	✓	✓
21	SANGEETHA SOMAN	✓	✓	✓
22	SURYA B S	✓	✓	✓
23	UNNIMAYA G	✓	✓	✓
24	AMAL P K	✓	✓	✓
25	ANU ANNA JOY	✓	✓	✓
26	ATHIRA THOMAS	✓	✓	✓
27	JESSIYA JACOB	✓	✓	✓
28	ARYA C MITRA	✓	✓	✓
29	ATHIRA RAJAN	✓	✓	✓
30	GOPIKA RAJ P	✓	✓	✓
31	VIJESH V	✓	✓	✓

Teacher-in-charge
Beena
Theresa Varghese



GATE 2019 Scorecard

Graduate Aptitude Test in Engineering

Candidate's Details

Name

NEHA LUKOSE

Registration Number

XL19S27044024

Examination Paper

Life Sciences (XL)

Sections : Botany (R)
Microbiology (S)



(Candidate's Signature)

Performance

Marks out of 100*

42.33

Valid from March 17, 2019 to March 16, 2022

Qualifying Marks**

36.7

33.0

24.5

All India Rank in this paper

1367

General

OBC (NCL)

SC/ST/PwD

GATE Score

448

Number of Candidates
Appeared in this paper

17986

* Normalized marks for multi-session papers

** A candidate is considered qualified if the marks secured are greater than or equal to the qualifying marks mentioned for the category for which valid category certificate, if applicable, is produced along with this scorecard

N. J. Vasa

Prof. Nilesh J. Vasa

March 17, 2019

Digital Fingerprint: 4f8a8f4bbce3e00bd7417f9c076355bb

Organizing Chairman, GATE 2019
(on behalf of NCB - GATE, for MHRD)



The GATE 2019 score is calculated using the formula

$$GATE\ Score = S_q + (S_t - S_q) \frac{(M - M_q)}{(\bar{M}_t - M_q)}$$

where,

M is the marks obtained by the candidate in the paper, mentioned on this GATE 2019 scorecard

M_q is the qualifying marks for general category candidate in the paper

\bar{M}_t is the mean of marks of top 0.1% or top 10 (whichever is larger) of the candidates who appeared in the paper (in case of multi-session papers including all sessions)

$S_q = 350$, is the score assigned to M_q

$S_t = 900$, is the score assigned to \bar{M}_t

In the GATE 2019 score formula, M_q is 25 marks (out of 100) or $\mu + \sigma$, whichever is greater. Here μ is the mean and σ is the standard deviation of marks of all the candidates who appeared in the paper.

Qualifying in GATE 2019 does not guarantee either an admission to a post-graduate program or a scholarship/assistantship. Admitting institutes may conduct further tests and interviews for final selection.

Codes for XE and XL Paper Sections (compulsory section and any other two sections)

XE: Engineering Sciences

- A - Engineering Mathematics (compulsory)
- B - Fluid Mechanics
- C - Materials Science
- D - Solid Mechanics
- E - Thermodynamics
- F - Polymer Science and Engineering
- G - Food Technology
- H - Atmospheric and Oceanic Sciences

XL: Life Sciences

- P - Chemistry (compulsory)
- Q - Biochemistry
- R - Botany
- S - Microbiology
- T - Zoology
- U - Food Technology

Graduate Aptitude Test in Engineering (GATE) 2019 was organized by Indian Institute of Technology Madras on behalf of the National Coordination Board (NCB) - GATE for the Department of Higher Education, Ministry of Human Resource Development (MHRD), Government of India.

2017-2018



MAR ATHANASIOS COLLEGE FOR ADVANCED STUDIES TIRUVALLA
(MACFAST)
Thiruvalla – 689101

NOTICE - COACHING FOR COMPETITIVE EXAMINATIONS

Dear Students,

School of Bioscience is organizing coaching classes for NET/GATE/ARS from 06-01-2017 to 03-03-2017, 3 pm to 4 pm, one class per week. Classes will be handled by Ms Treesa Varghese, Assistant Professor, School of Biosciences. Those students who are interested to join can inform to Ms Treesa Varghese before the starting date.

Date: 02-01-2017



Ms Treesa Varghese
Faculty-in charge

Training for competitive examinations

2017-2018

	Name of student	06-01-2017	10-02-2017	03-03-2017
1	Anjali S.	✓	✓	✓
2	Ria Elza Varghese	✓	✓	✓
3	Sonia Philip	✓	✓	✓
4	Varsha S.S.	✓	✓	✓
5	Amal Anand	✓	✓	✓
6	Anaswara Syam	✓	✓	✓
7	Parvathy j	✓	✓	✓
8	Parvathy Nandakumar	✓	✓	✓
9	Abhijith M. Anandan	✓	✓	✓
10	Anjumol K.P.	✓	✓	✓
11	Elma Susam Reji	✓	✓	✓
12	Aleena T Mathews	✓	✓	✓
13	Ambili M Thomas	✓	✓	✓
14	Ansu Mary John	✓	✓	✓
15	Sibin Babu	✓	✓	✓

Teacher-in-charge.

Preethi

Preethi Varghese



GATE 2018 Scorecard

Graduate Aptitude Test in Engineering

Candidate's Details

Name

RIXON RAJ

Registration Number

XL18S17072040

Examination Paper

Life Sciences (XL)

Sections : Biochemistry (Q)
Zoology (T)



(Candidate's Signature)

Performance

Marks out of 100*

30.67

Valid from March 17, 2018 to March 16, 2021

Qualifying Marks**

29.9

26.9

19.9

General

OBC (NCL)

SC/ST/PwD

All India Rank in this paper

2069

GATE Score

365

Number of Candidates
Appeared in this paper

14140

* Normalized marks for multi-session papers

** A candidate is considered qualified if the marks secured are greater than or equal to the qualifying marks mentioned for the category for which valid category certificate, if applicable, is produced along with this scorecard

Digital Fingerprint: 09c45136b03f73968a8120b2855bca01

G. Pugazhenth

Prof. G. Pugazhenth

March 17, 2018

Organizing Chairman, GATE 2018
(on behalf of NCB - GATE, for MHRD)

The GATE 2018 score is calculated using the formula

$$GATE\ Score = S_q + (S_t - S_q) \frac{(M - M_q)}{(\bar{M}_t - M_q)}$$

where,

M is the marks obtained by the candidate in the paper, mentioned on this GATE 2018 scorecard

M_q is the qualifying marks for general category candidate in the paper

\bar{M}_t is the mean of marks of top 0.1% or top 10 (whichever is larger) of the candidates who appeared in the paper (in case of multi-session papers including all sessions)

$S_q = 350$, is the score assigned to M_q

$S_t = 900$, is the score assigned to \bar{M}_t

In the GATE 2018 score formula, M_q is 25 marks (out of 100) or $\mu + \sigma$, whichever is greater. Here μ is the mean and σ is the standard deviation of marks of all the candidates who appeared in the paper.

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B - Fluid Mechanics

C - Materials Science

D - Solid Mechanics

E - Thermodynamics

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G - Food Technology

H - Atmospheric and Oceanic Sciences

XL: Life Sciences

P - Chemistry (compulsory)

Q - Biochemistry

R - Botany

S - Microbiology

T - Zoology

U - Food Technology

Graduate Aptitude Test in Engineering (GATE) 2018 was organized by Indian Institute of Technology Guwahati on behalf of the National Coordination Board (NCB) - GATE for the Department of Higher Education, Ministry of Human Resource Development (MHRD), Government of India.

AGRICULTURAL SCIENTISTS RECRUITMENT BOARD

(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)
NEW DELHI

राष्ट्रीय पात्रता परीक्षा NATIONAL ELIGIBILITY TEST



क्रम सं० / Sl. No.: NET(I)-2018 / 02690
अनुक्रमांक / Roll No.: 1020701896



प्रमाणित किया जाता है कि श्री RIXON RAJ पुत्र श्री RAJU EC ने व्याख्याता/सहायक प्रोफेसर पद की पात्रता हेतु कृ.वै.च.मं. द्वारा 9 अप्रैल 2018 को आयोजित राष्ट्रीय पात्रता परीक्षा पादप जैवरसायन विज्ञान विषय में उत्तीर्ण की है। इन्होंने अनारक्षित श्रेणी में आवेदन किया और 53.11% अंक प्राप्त कर अनारक्षित श्रेणी के लिए निर्धारित अहर्तांक प्राप्त करते हुए परीक्षा उत्तीर्ण की। यह प्रमाण-पत्र विश्वविद्यालय अनुदान आयोग/ वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद द्वारा भी उनके पत्र सं. क्रम सं. 15-1/98(NET) दिनांक 04.10.99 एवं 18-1/98(NET) दिनांक 02.07.2003 अनुसार मान्य है।

Certified that **Mr. RIXON RAJ** son of **Sh. RAJU EC** has qualified the National Eligibility Test conducted by ASRB on 9 April, 2018 in the Discipline of **Plant Biochemistry** for eligibility of Lecturership / Assistant Professorship. He had applied under **Un-Reserved** Category and has qualified by securing **53.11%** marks with the qualifying cut-off for **Un-Reserved** Category. This certificate is also recognized by the University Grants Commission (UGC)/Council of Scientific & Industrial Research (CSIR) vide their letters No. **15-1/98(NET)** dated **04.10.99** and **18-1/98(NET)** dated **02.07.2003**, respectively.

जारी तिथि / Date of Issue : 04 JAN 2019
उत्तीर्ण तिथि / Qualifying Date : 23.05.2018

परीक्षा नियंत्रक
Controller of Examination

संबंधित पृष्ठ के दूसरी ओर संबंधित नोट देखें
Please see relevant note overleaf.



वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
मानव संसाधन विकास समूह, परीक्षा एकक

Human Resource Development Group, Examination Unit
सी.एस.आई.आर. कॉम्प्लेक्स, लाईब्रेरी एवेन्यू, पुसा, नई दिल्ली-110 012
CSIR Complex, Library Avenue, Pusa, New Delhi-110 012

Dated: 11.12.2018

Sr.No. 1121732535
Ref.No: 17/12/2017(II) EU-V
ROLLNO: 377534
Sh. RIXON RAJ
S/O RAJU E C
ETTITHADATHIL HOUSE
KANAKKENTHURUTHY P O
VADAKKENCHERRY
PALAKKAD KERALA 678683



Sub: - Joint CSIR-UGC National Eligibility Test (NET) for Junior Research Fellowship (JRF) and for Lectureship (LS) held on 17.12.2017 and result declared on 09.05.2018.

Dear Candidate,

CSIR is pleased to inform you that you have been declared qualified in the above examination for award of Junior Research Fellowship and secured 54 rank in LIFE SCIENCES subject under CSIR Fellowship scheme. Further, you have also been declared qualified for eligibility for Lectureship (LS) in the above subject area, subject to fulfilling the eligibility criteria laid down by UGC.

The offer of Junior Research Fellowship is valid for a period of two years w.e.f. 01.07.2018 and is not extendable. It will be governed by the terms and conditions of the CSIR Junior Research Fellowship.

In order to accept this offer, you should send the joining report, undertaking and & attestation proforma (which can be downloaded from our website www.csirhrdg.res.in) and submit the same, duly completed in all respects to The Deputy Secretary (EMR)/US(EMR) at the address given overleaf.

This letter may be treated as a certificate.

Yours sincerely,

के. नहन्शांग / K. NGAHANSHANG
अवर सचिव (परीक्षा) / Under Secretary (Exam.)
वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
Council of Scientific & Industrial Research
सी. एस. आई. आर. कॉम्प्लेक्स, पुसा, नई दिल्ली-12
CSIR Complex, Pusa, New Delhi-110012

Important Note:

- (a) This certificate is being issued on the basis of information provided by the candidate in his/her application form. The appointing authority/fellowship awarding authority should verify the original records/certificates of the candidate while considering him/her for appointment/fellowship, as Examination Unit, CSIR Complex is not responsible for the same. In case the candidate has qualified under RA (Result Awaited Category) the certificate will be valid only from the date of acquiring the requisite qualification as stipulated in the notification. The details regarding the eligibility criteria for this test are given overleaf.
- (b) In case the candidate does not fulfil any of the eligibility conditions and Caste/PWD status (wherever applicable), this certificate may be treated as cancelled.

2016-2017



MAR ATHANASIOS COLLEGE FOR ADVANCED STUDIES TIRUVALLA
(MACFAST)
Thiruvalla – 689101


NOTICE - COACHING FOR COMPETITIVE EXAMINATIONS

Dear Students,

School of Bioscience is organizing coaching classes for NET/GATE/ARS from 09-01-2016 to 05-03-2016, 3 pm to 4 pm, one class per week. Classes will be handled by Ms Treesa Varghese, Assistant Professor, School of Biosciences. Those students who are interested to join can inform to Ms Treesa Varghese before the starting date.

Date: 02-01-2016




Ms Treesa Varghese
Faculty-in charge

Training for competitive examinations

2016-2017

	Name of student	09-01-2016	13-02-2016	05-03-2016
1	AISWARYA VASANTH	✓	✓	✓
2	NITHYA P	✓	✓	✓
3	LINTA JOSE	✓	✓	✓
4	SIMI SATHAR	✓	✓	✓
5	NISS MOL SHAJAN	✓	✓	✓
6	AHMED NABEEL M N	✓	✓	✓
7	DEVIKA V A	✓	✓	✓
8	SRUTHIMOL S KUMAR	✓	✓	✓
9	SREELEKSHMI N	✓	✓	✓
10	SOUMYA ZACCHARIAH	✓	✓	✓
11	SURIYAGAYATHRI V P	✓	✓	✓
12	SOUMYA ABRAHAM	✓	✓	✓
13	ANJU KRISHNAN	✓	✓	✓
14	LIJOY M JOSEPH	✓	✓	✓
15	DIBHA P S	✓	✓	✓
16	ANJU A	✓	✓	✓
17	ASHA ANTONY	✓	✓	✓
18	ASHA L P	✓	✓	✓
19	LIDA LALU	✓	✓	✓
20	PRASANTHY P	✓	✓	✓

Teacher-in-charge.
Dilesa
Dilesa Varghese.

राष्ट्रीय पात्रता परीक्षा
NATIONAL ELIGIBILITY TEST



क्रम सं० / Sl. No.: NET(I)-2017 / 01755
अनुक्रमांक / Roll No.: 2020700493



प्रमाणित किया जाता है कि श्री रिक्सन राज पुत्र श्री राजू इ सी ने व्याख्याता/सहायक प्रोफेसर पद की पात्रता हेतु कृ.वै.च.मं. द्वारा 17 मई 2017 को आयोजित राष्ट्रीय पात्रता परीक्षा पादप जैवरसायन विज्ञान विषय में उत्तीर्ण की है। इन्होंने अनारक्षित श्रेणी में आवेदन किया और 50.22% अंक प्राप्त कर अनारक्षित श्रेणी के लिए निर्धारित अहर्तांक प्राप्त करते हुए परीक्षा उत्तीर्ण की। यह प्रमाण-पत्र विश्वविद्यालय अनुदान आयोग/ वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद द्वारा भी उनके पत्र सं. क्रमशः 15-1/98(NET) दिनांक 04.10.99 एवं 18-1/98(NET) दिनांक 02.07.2003 अनुसार मान्य है।

Certified that **Mr. RIXON RAJ** son of **Sh. RAJU E C** has qualified the National Eligibility Test conducted by ASRB on 17 May, 2017 in the Discipline of **Plant Biochemistry** for eligibility of Lecturership / Assistant Professorship. He had applied under **Un-Reserved** Category and has qualified by securing **50.22%** marks with the qualifying cut-off for **Un-Reserved** Category. This certificate is also recognized by the University Grants Commission (UGC)/Council of Scientific & Industrial Research (CSIR) vide their letters No. 15-1/98(NET) dated 04.10.99 and 18-1/98(NET) dated 02.07.2003, respectively.

जारी तिथि / Date of Issue : 15 SEP 2017
उत्तीर्ण तिथि / Qualifying Date : 10.06.2017



परीक्षा नियंत्रक
Controller of Examination

Electronic Certificate No.:

171003858



University Grants Commission
NATIONAL EDUCATIONAL TESTING BUREAU



ज्ञान-विज्ञानं विमुक्तये

JOINT CSIR-UGC TEST

NATIONAL ELIGIBILITY TEST FOR ASSISTANT PROFESSOR

UGC Ref. No.:

Roll No.: 3858/(CSIR-UGC NET JUNE 2017)

Certified that

RIXON RAJ



Son/Daughter of

has qualified

the Joint CSIR-UGC NET for Eligibility for Assistant Professor held on
in the Subject

18-06-2017

LIFE SCIENCES

As per the information provided by the candidate, he/she had completed his/her Master's degree or equivalent examination at the time of applying for this test.

The date of Eligibility for Assistant Professor is the date of declaration of NET result, i.e.,
, OR the date of completion of Master's degree or equivalent examination with required percentage of marks within two years from the date of declaration of NET result, i.e., by
30th Nov. 2017, whichever is later.

This is an electronic certificate only. Its authenticity and category in which the candidate had appeared should be verified from UGC by the institution/appointing authority. This electronic certificate can also be verified by scanning QR Bar Code printed on the electronic certificate.

Validity of this electronic certificate is forever.

Date of Issue:

06-12-2018

Surender Singh

Head
NET Bureau

Note: UGC has issued the electronic certificate on the basis of information provided by the candidate in his/her Application Form. The appointing authority should verify the original records/certificates of the candidate while considering him/her for appointment, as the Commission is not responsible for the same. The candidate must fulfil the minimum eligibility conditions for NET as laid down in the notification for Joint CSIR-UGC Test.



MACFAST
the trendsetter in education

**MAR ATHANASIOS COLLEGE FOR
ADVANCED STUDIES TIRUVALLA**
ACCREDITED BY NAAC WITH 'A' GRADE
RECOGNIZED BY DSIR, GOVT. OF INDIA

NOTICE

COACHING OF COMPETITIVE EXAMINATIONS

Dear Students,

The School of Biosciences is organizing coaching classes for NET/GATE/ARS from 04-01-2020 to 15-02-2020. The class is one hour from 3pm to 4pm. Those who are interested to join the class can inform the faculty-in-charge (Dr. Treesa Varghese) on or before 04-01-2020. The classes are engaged by Ms. Elma Susan Thomas, Guest faculty, School of Biosciences.

Date:01-01-2020

Dr. Treesa Varghese

Faculty-in-charge



for
Head, School of Bio Sciences
Mar Athanasios College for Advanced Studies
(MACFAST)
Tiruvalla-689 101
India

A Minority Institution of the
Corporate Educational Agency of the
Catholic Archdiocese of Tiruvalla

Courses @
Main Campus
MBA & MCA

Courses @ Bio campus
M.Sc Biochemistry, M.Sc Biotechnology
M.Sc Bioinformatics, M.Sc Plant Biotechnology
M.Sc Food Technology & Quality Assurance
M.Sc Phytomedicine Science & Technology

E-mail
principal@macfast.org
macfast@macfast.org

Website
www.macfast.org
www.macfast.in

Details of Coaching given for NET/GATE/ARS

Training was given for NET/GATE/ARS during January 2021 to February 2021.
The training was for 7 days the faculty in charge for the programme was Dr.
Treesa Varghese

Student enrollment details

<u>Training for competitive examinations</u>								
<u>2020-2021</u>								
	Name of student	04-01-2020	11-01-2020	18-01-2020	25-01-2020	01-02-2020	08-02-2020	15-02-2020
1	Mejo George	✓	✓	✓	✓	✓	✓	✓
2	Devika B	✓	✓	✓	✓	✓	✓	✓
3	Freedia Sebastian	✓	✓	✓	✓	✓	✓	✓
4	Jayalakshmi T L	✓	✓	✓	✓	✓	✓	✓
5	Anjali T	✓	✓	✓	✓	✓	✓	✓
6	Salomy K S	✓	✓	✓	✓	✓	✓	✓
7	Parvathi Suresh	✓	✓	✓	✓	✓	✓	✓
8	Akshaya P.T	✓	✓	✓	✓	✓	✓	✓
9	Abiya Ann Mathew	✓	✓	✓	✓	✓	✓	✓
10	Theresa George	✓	✓	✓	✓	✓	✓	✓
11	Aparna Tom	✓	✓	✓	✓	✓	✓	✓
12	Parvathy U R	✓	✓	✓	✓	✓	✓	✓
13	Anju Alexander	✓	✓	✓	✓	✓	✓	✓
14	Anulekshmi	✓	✓	✓	✓	✓	✓	✓
15	Ardra A.P	✓	✓	✓	✓	✓	✓	✓
16	Anjali Murali	✓	✓	✓	✓	✓	✓	✓
17	Haritha M A	✓	✓	✓	✓	✓	✓	✓
18	Fathima Salim	✓	✓	✓	✓	✓	✓	✓

Teacher in-charge
Dr. Treesa Varghese




**CSIR-UGC National Eligibility Test (NET) for Junior Research Fellowship
and Lecturer-ship**

LIFE SCIENCES

1. Molecules and their Interaction Relevant to Biology
2. Cellular Organization
3. Fundamental Processes
4. Cell Communication and Cell Signaling
5. Developmental Biology
6. System Physiology – Plant
7. System Physiology – Animal
8. Inheritance Biology
9. Diversity of Life Forms
10. Ecological Principles
11. Evolution and Behavior
12. Applied Biology
13. Methods in Biology



for


Head, School of Bio Sciences
Mar Athanasios College for Advanced Studies
(MACFAST)
Tiruvalla-689 101
Kerala, India

1. MOLECULES AND THEIR INTERACTION RELEVANT TO BIOLOGY

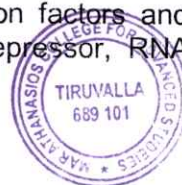
- A. Structure of atoms, molecules and chemical bonds.
- B. Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins).
- C. Stabilizing interactions (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.).
- D. Principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics, colligative properties).
- E. Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers.
- F. Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes
- G. Conformation of proteins (Ramachandran plot, secondary structure, domains, motif and folds).
- H. Conformation of nucleic acids (helix (A, B, Z), t-RNA, micro-RNA).
- I. Stability of proteins and nucleic acids.
- J. Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.

2. CELLULAR ORGANIZATION

- A) **Membrane structure and function**
(Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, membrane pumps, mechanism of sorting and regulation of intracellular transport, electrical properties of membranes).
- B) **Structural organization and function of intracellular organelles** (Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast, structure & function of cytoskeleton and its role in motility).
- C) **Organization of genes and chromosomes** (Operon, unique and repetitive DNA, interrupted genes, gene families, structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons).
- D) **Cell division and cell cycle** (Mitosis and meiosis, their regulation, steps in cell cycle, regulation and control of cell cycle).
- E) **Microbial Physiology** (Growth yield and characteristics, strategies of cell division, stress response)

3. FUNDAMENTAL PROCESSES

- A) **DNA replication, repair and recombination** (Unit of replication, enzymes involved, replication origin and replication fork, fidelity of replication, extrachromosomal replicons, DNA damage and repair mechanisms, homologous and site-specific recombination).
- B) **RNA synthesis and processing** (transcription factors and machinery, formation of initiation complex, transcription activator and repressor, RNA polymerases, capping,



elongation, and termination, RNA processing, RNA editing, splicing, and polyadenylation, structure and function of different types of RNA, RNA transport).

- C) **Protein synthesis and processing** (Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, and translational proof-reading, translational inhibitors, Post- translational modification of proteins).
- D) **Control of gene expression at transcription and translation level** (regulating the expression of phages, viruses, prokaryotic and eukaryotic genes, role of chromatin in gene expression and gene silencing).

4. Cell communication and cell signaling

- A) **Host parasite interaction** Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells, alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.
- B) **Cell signaling** Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways, bacterial and plant two-component systems, light signaling in plants, bacterial chemotaxis and quorum sensing.
- C) **Cellular communication** Regulation of hematopoiesis, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation.
- D) **Cancer**
Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.
- E) **Innate and adaptive immune system** Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity. B and T cell epitopes, structure and function of antibody molecules. generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen-antibody interactions, MHC molecules, antigen processing and presentation, activation and differentiation of B and T cells, B and T cell receptors, humoral and cell-mediated immune responses, primary and secondary immune modulation, the complement system, Toll-like receptors, cell-mediated effector functions, inflammation, hypersensitivity and autoimmunity, immune response during bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections, congenital and acquired immunodeficiencies, vaccines.



5. DEVELOPMENTAL BIOLOGY

A) Basic concepts of development : Potency, commitment, specification, induction, competence, determination and differentiation; morphogenetic gradients; cell fate and cell lineages; stem cells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development

B) Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination.

C) Morphogenesis and organogenesis in animals : Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis – vulva formation in *Caenorhabditis elegans*, eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development- larval formation, metamorphosis; environmental regulation of normal development; sex determination.

D) Morphogenesis and organogenesis in plants: Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum*

E) Programmed cell death, aging and senescence

6. SYSTEM PHYSIOLOGY - PLANT

A. Photosynthesis - Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO₂ fixation-C₃, C₄ and CAM pathways.

B. Respiration and photorespiration – Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway.

C. Nitrogen metabolism - Nitrate and ammonium assimilation; amino acid biosynthesis.

D. Plant hormones – Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.

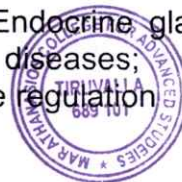
E. Sensory photobiology - Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins, stomatal movement; photoperiodism and biological clocks.



- F. **Solute transport and photoassimilate translocation** – uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates.
- G. **Secondary metabolites** - Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles.
- H. **Stress physiology** – Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses.

7. **SYSTEM PHYSIOLOGY - ANIMAL**

- A. **Blood and circulation** - Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, immunity, haemostasis.
- B. **Cardiovascular System:** Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above.
- C. **Respiratory system** - Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration.
- D. **Nervous system** - Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture.
- E. **Sense organs** - Vision, hearing and tactile response.
- F. **Excretory system** - Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance.
- G. **Thermoregulation** - Comfort zone, body temperature – physical, chemical, neural regulation, acclimatization.
- H. **Stress and adaptation**
- I. **Digestive system** - Digestion, absorption, energy balance, BMR.
- J. **Endocrinology and reproduction** - Endocrine glands, basic mechanism of hormone action, hormones and diseases; reproductive processes, gametogenesis, ovulation, neuroendocrine regulation.



8. INHERITANCE BIOLOGY

- A) Mendelian principles :** Dominance, segregation, independent assortment.
- B) Concept of gene :** Allele, multiple alleles, pseudoallele, complementation tests
- C) Extensions of Mendelian principles :** Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters.
- D) Gene mapping methods :** Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.
- E) Extra chromosomal inheritance :** Inheritance of Mitochondrial and chloroplast genes, maternal inheritance.
- F) Microbial genetics :** Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.
- G) Human genetics :** Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.
- H) Quantitative genetics :** Polygenic inheritance, heritability and its measurements, QTL mapping.
- I) Mutation :** Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis.
- J) Structural and numerical alterations of chromosomes :** Deletion, duplication, inversion, translocation, ploidy and their genetic implications.
- K) Recombination :** Homologous and non-homologous recombination including transposition.

9. DIVERSITY OF LIFE FORMS:

A. Principles & methods of taxonomy:

Concepts of species and hierarchical taxa, biological nomenclature, classical & quantitative methods of taxonomy of plants, animals and microorganisms.

B. Levels of structural organization:

Unicellular, colonial and multicellular forms. Levels of organization of tissues, organs & systems. Comparative anatomy, adaptive radiation, adaptive modifications.



- C. **Outline classification of plants, animals & microorganisms:**
Important criteria used for classification in each taxon. Classification of plants, animals and microorganisms. Evolutionary relationships among taxa.
- D. **Natural history of Indian subcontinent:**
Major habitat types of the subcontinent, geographic origins and migrations of species. Common Indian mammals, birds. Seasonality and phenology of the subcontinent.
- E. **Organisms of health & agricultural importance:**
Common parasites and pathogens of humans, domestic animals and crops.
- F. **Organisms of conservation concern:**
Rare, endangered species. Conservation strategies.

10. ECOLOGICAL PRINCIPLES

The Environment: Physical environment; biotic environment; biotic and abiotic interactions.

Habitat and Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.

Population Ecology: Characteristics of a population; population growth curves; population regulation; life history strategies (r and K selection); concept of metapopulation – demes and dispersal, interdemec extinctions, age structured populations.

Species Interactions: Types of interactions, interspecific competition, herbivory, carnivory, pollination, symbiosis.

Community Ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones.

Ecological Succession: Types; mechanisms; changes involved in succession; concept of climax.

Ecosystem Ecology: Ecosystem structure; ecosystem function; energy flow and mineral cycling (C,N,P); primary production and decomposition; structure and function of some Indian ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, eustarine).

Biogeography: Major terrestrial biomes; theory of island biogeography; biogeographical zones of India.



Applied Ecology: Environmental pollution; global environmental change; biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches.

Conservation Biology: Principles of conservation, major approaches to management, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves).

11. EVOLUTION AND BEHAVIOUR

A. Emergence of evolutionary thoughts

Lamarck; Darwin—concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis.

B. Origin of cells and unicellular evolution:

Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiment of Miller (1953); The first cell; Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism.

C. Paleontology and Evolutionary History:

The evolutionary time scale; Eras, periods and epoch; Major events in the evolutionary time scale; Origins of unicellular and multi cellular organisms; Major groups of plants and animals; Stages in primate evolution including Homo.

D. Molecular Evolution:

Concepts of neutral evolution, molecular divergence and molecular clocks; Molecular tools in phylogeny, classification and identification; Protein and nucleotide sequence analysis; origin of new genes and proteins; Gene duplication and divergence.

E. The Mechanisms:

Population genetics – Populations, Gene pool, Gene frequency; Hardy-Weinberg Law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution.

F. Brain, Behavior and Evolution:

Approaches and methods in study of behavior; Proximate and ultimate causation; Altruism and evolution-Group selection, Kin selection, Reciprocal altruism; Neural basis



of learning, memory, cognition, sleep and arousal; Biological clocks; Development of behavior; Social communication; Social dominance; Use of space and territoriality; Mating systems, Parental investment and Reproductive success; Parental care; Aggressive behavior; Habitat selection and optimality in foraging; Migration, orientation and navigation; Domestication and behavioral changes.

12. **APPLIED BIOLOGY:**

- A. Microbial fermentation and production of small and macro molecules.
- B. Application of immunological principles, vaccines, diagnostics. Tissue and cell culture methods for plants and animals.
- C. Transgenic animals and plants, molecular approaches to diagnosis and strain identification.
- D. Genomics and its application to health and agriculture, including gene therapy.
- E. Bioresource and uses of biodiversity.
- F. Breeding in plants and animals, including marker – assisted selection
- G. Bioremediation and phytoremediation
- H. Biosensors



13. METHODS IN BIOLOGY

A. Molecular Biology and Recombinant DNA methods:

Isolation and purification of RNA, DNA (genomic and plasmid) and proteins, different separation methods.

Analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis, Isoelectric focusing gels.

Molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems.

Expression of recombinant proteins using bacterial, animal and plant vectors.

Isolation of specific nucleic acid sequences

Generation of genomic and cDNA libraries in plasmid, phage, cosmid, BAC and YAC vectors.

In vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms.

Protein sequencing methods, detection of post translation modification of proteins.

DNA sequencing methods, strategies for genome sequencing.

Methods for analysis of gene expression at RNA and protein level, large scale expression, such as micro array based techniques

Isolation, separation and analysis of carbohydrate and lipid molecules

RFLP, RAPD and AFLP techniques

B. Histochemical and Immunotechniques

Antibody generation, Detection of molecules using ELISA, RIA, western blot, immunoprecipitation, fluocytometry and immunofluorescence microscopy, detection of molecules in living cells, in situ localization by techniques such as FISH and GISH.

C. Biophysical Method:

Molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy Molecular structure determination using X-ray diffraction and NMR, Molecular analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods.

D. Statistcal Methods:

Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and normal); Sampling distribution; Difference between parametric and non-parametric statistics; Confidence Interval; Errors; Levels of significance; Regression and Correlation; t-test; Analysis of variance; X^2 test;; Basic introduction to Muetrovariate statistics, etc.



E. **Radiolabeling techniques:**

Detection and measurement of different types of radioisotopes normally used in biology, incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guidelines.

F. **Microscopic techniques:**

Visualization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etch and freeze-fracture methods for EM, image processing methods in microscopy.

G. **Electrophysiological methods:**

Single neuron recording, patch-clamp recording, ECG, Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI, fMRI, CAT.

H. **Methods in field biology:**

Methods of estimating population density of animals and plants, ranging patterns through direct, indirect and remote observations, sampling methods in the study of behavior, habitat characterization: ground and remote sensing methods..

csirhrdg.res.in



for
Head, School of Bio Sciences
Mar Athanasios College for Advanced Studies
(MACFAST)
Tiruvalla-689 101
Kerala India