KANNUR UNIVERSITY
(Abstract)

BSc Biotechnology Programme - Revised Scheme, Syllabus& Model Question Papers of Core, Complementary and Open Courses under Choice Based Credit Semester System for Under Graduate Programme - implemented with effect from ***2014 admission - Orders Issued.***

ACADEMIC BRANCH

No. Acad/C2/5444/2014 **Dated, Civil Station P.O, 28- 05-2014**

Read: 1.U.O No. Acad/C2/2232/2014 dated 14-03-2014
2. Minutes of the meeting of the Board of Studies in Biotechnology (Cd) held on 05-11-2013
3. Minutes of the meeting of the Faculty of Science held 25-03-2014
4. Letter dated 12-05-2014 from the Chairman, BOS in Biotechnology (Cd)

ORDER

1. The Revised Regulations for UG Programme under Choice based Credit Semester System were implemented in this University with effect from 2014 admission as per paper read (1) above.

2. As per paper read (2) above the Board of Studies in Biotechnology (Cd) finalized the Scheme , Syllabus & model Question Papers for Core, Complementary & open courses of BSc Biotechnology programme to be implemented with effect from 2014 admission..

3. As per read (3) above the Faculty of Science held on 25-03-2014 approved Scheme, syllabus & model question papers for core/complementary & open courses of BSc Biotechnology programme to be implemented with effect from 2014 admission.

4. The Chairman, Board of Studies in Biotechnology (Cd) vide paper read (4) above has submitted the finalized copy of Scheme, syllabus & Model question papers for core/complementary and open courses of BSc Biotechnology programme for implementation with effect from 2014 admission.

5. The Vice Chancellor, after examining the matter in detail, and in exercise of the powers of the Academic Council as per section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction to implement the revised scheme, syllabus & model question papers of BSc Biotechnology Programme with effect from 2014 admission.

6. Orders, are therefore issued implementing the revised scheme, syllabus & model question papers for core, complementary& open courses of BSc Biotechnology programme under CBCSS with effect from 2014 admission subject to report to Academic Council

7. Implemented revised Syllabus is appended.

SD/-
DEPUTY REGISTRAR (ACADEMIC)

FOR REGISTRAR

To:

1. The Principals of Affiliated Colleges offering B.Sc Biotechnology Programme
2. The Examination Branch (through PA to CE)

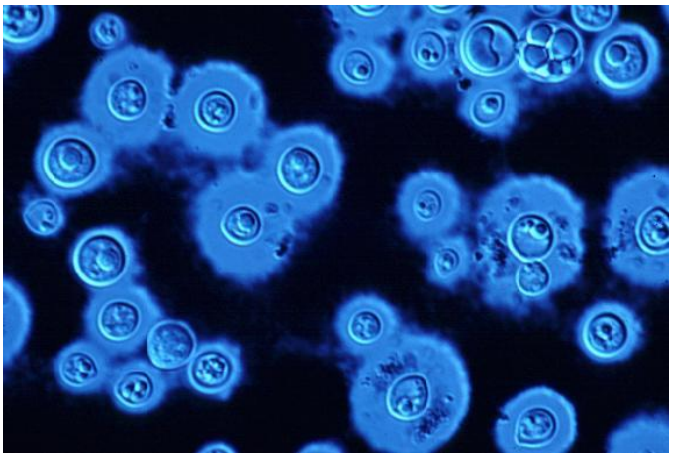
Copy To:

1. The Chairman, BOS Biotechnology (Cd)
2. PS to VC/PA to PVC/PA to Registrar
3. DR/AR I Academic
4. Central Library
5. SF/DF/FC.

Approved/By Order

Section Officer

❖ ***For more details log on to www.kannur university.ac.in***



SCHEME, COURSES, CREDIT DISTRIBUTION & SYLLABUS

B.Sc. BIOTECHNOLOGY PROGRAMME

In

KANNUR UNIVERSITY

(KUCBSS-UG-2014 ADMISSION ONWARDS)

SCHEME, COURSES & CREDIT DISTRIBUTION FOR B.Sc. BIOTECHNOLOGY PROGRAMME (KUCBSS-UG-2014 ADMISSION ONWARDS)

		SEMESTER 1			
NO	**CODE**	**COURSE**	**TITLE OF COURSE**	**MARKS**	**CREDIT**
1		COMMON ENGLISH COURSE I		50	4
2		COMMON ENGLISH COURSE II		50	3
3		ADDITIONAL LANGUAGE COURSE I		50	4
4		COMPLEMENTARY COURSE 1A		50	3
5		COMPLEMENTARY COURSE 2A		50	3
6	**1B01BTC**	CORE COURSE	CELL BIOLOGY	50	3
			SEMESTER TOTAL	**300**	**20**
		SEMESTER 2			
NO	**CODE**	**COURSE**	**TITLE OF COURSE**	**MARKS**	**CREDIT**
1		COMMON ENGLISH COURSE III		50	4
2		COMMON ENGLISH COURSE IV		50	3
3		ADDITIONAL LANGUAGE COURSE II		50	4
4		COMPLEMENTARY COURSE 1B		50	3
5		COMPLEMENTARY 2B		50	3
6	**2B02BTC**	CORE COURSE	GENETICS	50	3
			SEMESTER TOTAL	**300**	**20**
		SEMESTER 3			
NO	**CODE**	**COURSE**	**TITLE OF COURSE**	**MARKS**	**CREDIT**
1	**3A 11BTC**	GENERAL COURSE I	METHODOLOGY & PERSPECTIVE OF SCIENCE	50	4
2	**3A12BTC**	GENERAL COURSE II	INFORMATICS & INTRODUCTION TO BIOINFORMATICS	50	4
3		COMPLEMENTARY COURSE 1C		50	3
4		COMPLEMENTARY 2C		50	3
5	**3B03BTC**	CORE COURSE	IMMUNOLOGY	50	3
6	**3B04BTC**	CORE COURSE	PLANT PHYSIOLOGY	50	3
7	**3B05BTC**	CORE COURSE	BIOTECHNOLOGY PRACTICAL I	50	3
			SEMESTER TOTAL	**350**	**23**

		SEMESTER 4			
NO	**CODE**	**COURSE**	**TITLE OF COURSE**	**MARKS**	**CREDIT**
1	**4A13BTC**	GENERAL COURSE III	BASIC BIOPHYSICS	50	4
2	**4A14BTC**	GENERAL COURSE IV	BIOSTATISTICS	50	4
3		COMPLEMENTARY COURSE 1D		50	3
4		COMPLEMENTARY 2D		50	3
5	**4B06BTC**	CORE COURSE	ANIMAL PHYSIOLOGY	50	3
6	**4B07BTC**	CORE COURSE	BIOTECHNOLOGY PRACTICAL II	50	4
			SEMESTER TOTAL	**300**	**21**
		SEMESTER 5			
NO	**CODE**	**COURSE**	**TITLE OF COURSE**	**MARKS**	**CREDIT**
1	**5B08BTC**	CORE COURSE	MOLECULAR BIOLOGY	50	3
2	**5B09BTC**	CORE COURSE	INDUSTRIAL BIOTECHNOLOGY	50	3
3	**5B10BTC**	CORE COURSE	ANIMAL CELL BIOTECHNOLOGY	50	3
4	**5B11BTC**	CORE COURSE	ENVIRONMENTAL BIOTECHNOLOGY	50	3
5	**5B12BTC**	CORE COURSE	BIOTECHNOLOGY PRACTICAL-III	50	4
6	**5D01BTC / 5D02BTC**	OPEN COURSE	ENVIRONMENTAL SCIENCE / FERMENTATION TECHNOLOGY*****	25	2
			SEMESTER TOTAL	**275**	**18**
		SEMESTER 6			
NO	**CODE**	**COURSE**	**TITLE OF COURSE**	**MARKS**	**CREDIT**
1	**6B13BTC**	CORE COURSE	GENETIC ENGINEERING	50	3
2	**6B14BTC**	CORE COURSE	DEVELOPMENTAL BIOLOGY	50	3
3	**6B15BTC**	CORE COURSE	PLANT BIOTECHNOLOGY	50	3
4	**6B16BTC**	CORE COURSE	MEDICAL BIOTECHNOLOGY	50	3
5	**6B17BTC**	CORE COURSE	BIOTECHNOLOGY PRACTICAL-IV	50	4
6	**6B18BTC**	PROJECT WORK		25	2
			SEMESTER TOTAL	**275**	**18**
			PROGRAMME TOTAL	**1800**	**120**

KANNUR UNIVERSITY
CORE COURSES & CREDIT DISTRIBUTION FOR
B.Sc. BIOTECHNOLOGY PROGRAMME
(KUCBSS-UG-2014 ADMISSION ONWARDS)

NO	SEM	COURSE CODE	TITLE OF COURSE	HOUR /WEEK	CREDIT
1	I	1B01BTC	CELL BIOLOGY	4	3
2	II	2B02BTC	GENETICS	4	3
3	III	3B03BTC	IMMUNOLOGY	4	3
4	III	3B04BTC	PLANT PHYSIOLOGY	4	3
5	III	3B05BTC	BIOTECHNOLOGY PRACTICAL I	3	3
6	III	3A11BTC	METHODOLOGY & PERSPECTIVE OF SCIENCE	5	4
7	III	3A12BTC	INFORMATICS & INTRODUCTION TO BIOINFORMATICS	5	4
8	IV	4B06BTC	ANIMAL PHYSIOLOGY	5	3
9	IV	4B07BTC	BIOTECHNOLOGY PRACTICAL II	4	4
10	IV	4A13BTC	BASIC BIOPHYSICS	4	4
11	IV	4A14BTC	BIOSTATISTICS	4	4
12	V	5B08BTC	MOLECULAR BIOLOGY	5	3
13	V	5B09BTC	INDUSTRIAL BIOTECHNOLOGY	4	3
14	V	5B10BTC	ANIMAL CELL BIOTECHNOLOGY	5	3
15	V	5B11BTC	ENVIRONMENTAL BIOTECHNOLOGY	5	3
16	V	5B12BTC	BIOTECHNOLOGY PRACTICAL-III	4	4
17	V	5D01BTC / 5D02BTC	ENVIRONMENTAL SCIENCE / FERMENTATION TECHNOLOGY *	2	2
18	VI	6B13BTC	GENETIC ENGINEERING	4	3
19	VI	6B14BTC	DEVELOPMENTAL BIOLOGY	4	3
20	VI	6B15BTC	PLANT BIOTECHNOLOGY	4	3
21	VI	6B16BTC	MEDICAL BIOTECHNOLOGY	4	3
22	VI	6B17BTC	BIOTECHNOLOGY PRACTICAL-IV	4	4
23	VI	6B18BTC	PROJECT WORK	5	2

*Among Two Open Courses Only One Can Be Offered

KANNUR UNIVERSITY
COURSES & CREDIT DISTRIBUTION FOR B.Sc. BIOTECHNOLOGY (COMPLEMENTARY) PROGRAMME

(KUCBSS-UG-2014 ADMISSION ONWARDS)

NO	SEM	COURSE CODE	TITLE OF COURSE	HOUR /WEEK	CREDIT
1	I	1C01BTC	ENVIRONMENTAL BIOTECHNOLOGY	4	3
2	II	2C02BTC	FOOD BIOTECHNOLOGY	4	3
3	III	3C03BTC	PLANT BIOTECHNOLOGY	4	3
4	IV	4C04BTC	BIOTECHNOLOGY PRACTICAL	4	3

SYLLABUS

B.Sc. BIOTECHNOLOGY PROGRAMME (KUCBSS-UG-2014 ADMISSION ONWARDS)

(CORE COURSES)

1B01BTC: CELL BIOLOGY

Module I

Cell as a basic unit of life- cell theory - general organization of cell - origin of life

Module II

Broad classification of cell types- PPLOs, bacteria, eukaryotic microbes, plant and animal cells – cell, tissue, organ and organism as different levels of organization.

Module III

Ultra structure of cell membrane - unit membrane model, fluid mosaic model - functions of cell membrane - passive and active transport, cytoplasmic matrix - properties

Module IV

Structure and functions of cell organelles - Golgi bodies, endoplasmic reticulum (smooth and rough), mitochondria, chloroplast, lysosome, peroxisome, cytoskeletal structures - (actin, microtubules), ribosome, nucleus(nuclear membrane, nucleoplasm, nucleolus, chromatin)

Module V

Chromosome structure, organization of chromatin, nucleosome model, nucleoproteins - histone and non histone, special types of chromosome - salivary gland chromosome and lamp brush chromosomes

Module VI

Cell cycle and cell division - mitosis and meiosis - significance, cell locomotion (amoeboid, flagellar and ciliar), cell senescence and death

References:

1. Cell and molecular biology- Concepts and experiments. Gerald Karp. John Wiley and sons. Inc.
2. Molecular biology of the Gene. James D Watson, Tania A Baker, Stephen P Bell, Alexander Gann, Michael Levine, Richard Losick. Pearson Education.
3. Genes IX. Benjamin Lewin. Jones and Bartlett Publishers.
4. Molecular cell biology. Lodish, Berk, Matsudara, Kaiser, Krieger, Scott, Zipursky, Darnell. W H Freeman& Co. New York.

2B02BTC: GENETICS

Module I

Mendel's work – selection of experimental plant, procedure, experimental observations and results, monohybrid and di-hybrid crosses, law of segregation, law of independent assortment, back cross, test cross. Modification of mono-hybrid and di-hybrid ratio – incomplete, dominance, co-dominance, lethality, penetrance – complete and incomplete penetrance, expressivity, pleiotropism, polygenetic effect

Module II

Inter genetic interactions – epistasis – dominant epistasis, recessive epistasis, duplicate genes with cumulative effect, complementary genes or duplicative recessive genes, duplicative dominant genes, non-epistatic interactions, atavism or reversion.

Module III

Multiple allelism – examples coat colour in rabbits, blood group inheritance in man (ABO and Rh-antigen)

Module IV

Linkage and crossing over - complete and incomplete linkage, linkage groups, significance of linkage, mechanism of crossing over, types of crossing over, factors affecting crossing over, two point cross, three point cross, linkage map.

Module V

Sex linked genes and its inheritance, inheritance of XY linked genes, X-linked genes, Y-linked genes, sex limited genes, sex influenced genes. Extra chromosomal inheritance in mitochondria and chloroplast

Module VI

Numerical and structural chromosomal aberrations – euploidy, aneuploidy, non-disjunction in autosomes and sex chromosomes (example from humans)

Module VII

Population genetics – hardy-Weinberg equilibrium, gene frequencies and genotype frequencies

References:

1. Genetics – from genes to genomes, Leland H. Hartwell et al., Mc Graw Hill
2. Genetics, Monroe W. Strickberger, Prentice Hall of India
3. Principles of Genetics, Sinnot, E.W., Dunn, LC and Dobzhansky, T,
4. Principles of Genetics, Gardner, E.J. and Snustad, D.P. John Wiley
5. Genetics, P.S.verma and V.K.Agarwal, S.Chand publishers

3B03BTC: IMMUNOLOGY

Module 1
Historical perspective, cells and organs of immune system and their functions

Module 2
Types of immunity – innate immunity – components of innate immunity, adaptive or acquired immunity – passive and active immunity – natural and induced, humoral and cell mediated immunity.

Module 3
Humoral immunity – antigen – nature of antigen - factors affecting immunity, epitopes, haptens. Antibody – structure, classification, antigen-antibody interactions – forces involved, functions of antibody – complement activation – pathways –cell lysis, opsonization, immune clearance, inflammatory response, antibody mediated opsonization, ADCC, transcytosis, primary and secondary humoral immune response, monoclonal and polyclonal antibodies, applications of monoclonal antibodies

Module 4
Cell mediated immunity – MHC molecules, antigen processing and presentation – different pathways, mechanism of cytotoxic response - role of T helper cells

Module 5
Hypersensitivity reactions, autoimmunity, transplantation antigens (brief account), tumor antigen (brief account), vaccines

References:

1. Immunology, Richard A. et al., Kuby, W.H. Freeman and company
2. Immunology, Roitt, Brostoff, Male, Mosb
3. Medical immunology, Tristram G. Parslow et al., Mc Graw Hill
4. Immunology, Tizard, Thomson publishers

3B04BTC: PLANT PHYSIOLOGY

Module I

Plant - Water relations, Diffusion and Osmosis, Water potential, Absorption of water, transpiration pull and ascent of sap. Transpiration and its significance. Factors affecting transpiration. Mechanism of stomatal movement

Module II

Essential, non- essential, macro and micro elements, brief account only; Assimilation of Mineral Nutrients -Transport of ions across cell membranes, passive absorption and active absorption; Translocation in the phloem: Structure-function relationship for the translocation of photo-assimilates from source to sink cells.

Module III

Patterns of plant growth, growth kinetics, flow analogy of plant growth, measurement of growth. Plant growth regulators - physiological functions of Auxins, Gibberillins, Cytokinins, Ethylene and Abscisic acid - Plant movements: Nastic movements, Tropisms-Phototropism, Gravitropism

Module IV

Photo morphogenesis- Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropism; photoperiodism and vernalization; Biological clocks.

Module V

Dormancy - Seed longevity and germination, seed dormancy, methods of breaking seed dormancy, bud dormancy.

Module VI

Stress physiology-Introduction to stress, types of stress, stress resistance, effects of stress, drought stress, salt stress, temperature stress.

References:

1. Salisbury, F.B., Ross C.Plant Physiology-Wordsworth Pub,California.
2. Teiz and Zeiger-Plant Physiology, Sinaeur Associates Inc. Pub, Sundeland.
3. Verma S.K.,Mohit Verma-A textbook of Plant Physiology, Biochemistry and Biotechnology-S. Chand & Company Ltd.
4. Dr. Jain V.K.-Fundamentals of Plant Physiology,Revised edition-S. Chand & Company Pvt. Ltd.
5. Pandey S.N., Chadha A-Plant Anatomy and Embryology-Vikas Publishing House Pvt. Ltd.

3B05BTC: BIOTECHNOLOGY PRACTICAL I

1. Microscopy
2. Micrometry – calibration of ocular micrometer, cell size measurement
3. Bucal epithelial smear
4. Onion peel to study plant cell
5. Separation of cell organelles by differential centrifugation
6. Identification of animal and plant tissues
7. Demonstration of Barr body
8. Mitosis
9. Meiosis
10. Induced chromosomal aberrations
11. Study of human karyotype
12. Genetic problems

3A11BTC: METHODOLOGY AND PERSPECTIVE OF SCIENCE

Module I

Knowledge, hypothesis, theories and laws in science: Types of knowledge – practical, theoretical and scientific knowledge, Information - Science – theories and laws in science, basis for scientific laws and factual truths, scientific temper, empiricism, vocabulary of science, revolutions in science and technology, revision of scientific theories and laws. Hypotheses – formulation of hypothesis – deductive and inductive model, significance of verification – corroboration and falsification, auxiliary hypothesis, ad-hoc hypothesis. Importance of models – biological models, simulations and virtual testing, depositories of scientific information

Module II

Ethics in science: Transparency, honesty, sharing of knowledge, danger of preconceived ideas, bias, plagiarism

Module III

Experiments in Science: Design of experiment, experimentation, selection of controls, observation, data collection, documentation of experiments, treatment of data, data interpretation, significance of statistical tools in data interpretation, errors, inaccuracies, repeatability and reproducibility, accuracy and precision, reporting of observational and experimental data.

Module IV

Instrumentation - Methods in Biotechnology: Isolation and characterization of microorganisms, Sterilization, disinfection, handling of pathogenic organisms and hazardous chemicals, safety measures, Bio-safety, Extraction methods, Principles and working of pH meter, Laminar air flow and Centrifugation. Chromatographic techniques, Electrophoresis of DNA, RNA & Proteins (AGE and PAGE), Basic principles of Colorimetry and spectrophotometry. Blotting and hybridization techniques (Southern, Northern and Western). Radio isotopic techniques and Autoradiography.

References:

1. An introduction to the history and philosophy of science, R V G Menon, Pearson
2. The scientific endeavor – Methodology and perspective of sciences, Jeffrey A. Lee, Pearson
3. Methodology and perspectives of sciences, K.Vijayakumaran Nair, Biju Dharmapalan, Academia
4. Research Methodology, L.R.Potti, Yamuna publications
5. Methodology and Perspectives in botanical sciences, K.V.Mohanan and P.K.Sumodan, Manjusha publications

3A12BTC: INFORMATICS & INTRODUCTION TO BIOINFORMATICS

Module I

Overview of information technology-Features of modern personal computer and peripherals, computer network & internet, wireless technology, cellular wireless network, mobile phone technology, introduction to ATM, purchase technology, overview of operating system and major application software ,INFLIBNET, NICNET, BRNET

Module II

Social informatics - e-governance, free software movement, cyber issues, information overload, e-waste & green computing, Unicode, IT & regional language, application of IT in medicine, defense, crime detection, commerce, industry and education - Futuristic IT-virtual reality & artificial intelligence

Module III

Introduction to bioinformatics- History, definition, bioinformatics, introduction, importance and uses of bioinformatics, Information technology, biological data, data bases, protein sequencing, nucleic acid sequencing, sequence to structure relationships.

Module IV

Human genome project- History, nucleic acids, genes, genomes, contribution of various countries, About National Institute of Human Genome Project (NHGRI), introduction and need of human genome project, rough and final draft of human genome project, goals of the HGP, uses and applications, overview of genomics and proteomics.

References:

1. Informatics: Technology in action .Alan Evans .Pearson.
2. Introduction to bioinformatics by T.K Altwood, Tarry-smith, Phukan
3. Bioinformatics: Sequence and genome analysis, David W. Mount.

4B06BTC: ANIMAL PHYSIOLOGY

Module I

Molecular basis of muscle contraction- Energetics of muscle contraction - Vertebrate muscle types- neuronal control of muscle

Module II

Respiration-Fundamentals of gas exchange- respiratory pigments-structure biological properties, functions O_2 and CO_2 transport. Factors that determine oxygen binding to haemoglobin-PO_2, pH, temperature, DPG level

Module III

Blood vascular system-structure and function, closed and open-mechanism of blood circulation in man-peripheral circulation, microcirculation and capillary function, haematopoiesis, haemodynamics, cardiac rhythms ,factors modifying cardiac rhythm-mechanical, chemical, thermal, nervous.

Module IV

Homeostasis-regulation of body fluid composition in invertebrates and vertebrates, renal function- ultra filtration, absorption, secretion, plasma clearance, counter current mechanism- counter current multiplier, factors regulating homeostasis.

Module V

Sensory receptors - visual systems, mechanoreceptors, proprioceptors, hearing, chemoreceptor, olfactory receptors - cutaneous receptors - touch-pressure, pain & thermal

Module VI

Nervous system-Synapses, electrically mediated transmission and chemical transmission, synaptic potential, synaptic polarity.

Module VII

Endocrinology-introduction- endocrine glands, classification, hormones-classification based on chemical nature, arenas of endocrine control. Major human endocrine glands - structure, secretions, synthesis, storage, transport, metabolism and physiological functions. Mode of action, protein and steroid hormones with examples. Neuroendocrine secretions. Regulation of endocrine factors - hypothalamus, hypophysial axis, feedback mechanisms, nervous system

References:

1. Guyton and Hall-Textbook of Medical Physiology-Elsevier.
2.Richard W. Hill, Gordan A.Wyse-Animal Physiology-Harper and Row Publishers, New York.

3. William F. Ganong - Review of Medical Physiology, International edition-The Mc Graw-Hill Companies
4. Rastogi S.C.-Essentials of Animal Physiology-New Age International Publications.

4B07BTC: BIOTECHNOLOGY PRACTICAL II

1. Study of permanent slides of organs of immune system
2. Blood smear to study different WBCs
3. Blood grouping using antiserum A, B and Rh
4. Enzyme linked immunoassay
5. Radial immunodiffusion
6. Differential WBC count
7. Enumeration of total WBC
8. Enumeration of total RBC
9. Estimation of hemoglobin by hemocytometer and colourimeter
10. Demonstration of osmotic hemolysis
11. Onion root experiment to study rata of growth
12. Measurement of growth rate of shoot
13. Demonstration of epical dominance
14. Breaking of seed dormancy
15. Dry weight analysis
16. Role of light on seed germination
17. clinostat

4A13BTC: BASIC BIOPHYSICS

Module I

Introduction to biophysics - biological importance of surface tension, diffusion, adsorption, colloids and dialysis - Osmosis - osmotic pressure, iso-, hypo- & hypertonic solution & their influence on cell

Module II

Thermodynamics & Chemical kinetics-open, closed & isolated system-law of thermodynamics, thermodynamic equilibrium, concept of enthalpy, entropy & free energy. Chemical kinetics-rate, order, molecularity, energy of activation

Module III

Structure of biological membrane-fluid mosaic model, transport process, active & passive process, diffusion, Active & passive bioelectric property of excitable cell membrane as neurons

Module IV

Confirmation of oligo & polysaccharide-conjugate form of protein & lipids

Module V

Biophysical structure of nucleic acid, unusual base pairing - Hoogsteen & Reverse Hoogsteen, triplex & quadruplex forms of DNA, DNA super coiling, t-RNA structure-2°,3°,4°,motifs involved.

Module VI

Structural hierarchy of proteins - basics, irregular and random structures in protein - Protein-nucleic acid interaction, structure of ribozyme

References:

1. Thomas E Creighton-The Biophysical Chemistry of Nucleic acids and Proteins
2. Roy .R.N-Textbook of Biophysics.
3. Reginald H Garrett,Charles .M Grisham-Biochemistry
4. Lehninger- Principles of Biochemistry
5. Narayana.P- Principles of Biophysics

4A14BTC: BIOSTATISTICS

Module I

Data – collection of data, population, sample, types of data – primary and secondary data qualitative and quantitative data, grouped and ungrouped data, discrete and continuous data

Module II

Presentation of data – tables –different types, , bar diagrams, pie diagram, histogram, stem and leaf diagram, line chart, Frequency distribution – frequency table, frequency polygon, frequency curve , cumulative frequency distribution, cumulative frequency table – less than and more than, ogives

Module III

Measures of central tendency – mean – arithmetic mean, weighted mean, logarithmic mean, geometrical mean, median, mode- method of calculation for grouped and ungrouped data, normal distribution curve - symmetric and asymmetric – kurtosis and skieveness

Module IV

Measures of dispersion – absolute and relative measures - range, quartile deviation, mean deviation, variance, standard deviation, standard error, coefficient of variation (with examples from groped and ungrouped data, analysis of variance (ANOVA)

Module V

Test of significance- t-test, Z-test, chi-square test

Module VI

Correlation – types of correlation between variables, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient.

Module VII

Probability – random experiments, sample space, event, elementary event, compound event, equally likely events, mutually exclusive events, exhaustive events, dependent and independent events, laws of probability with examples

References:

1. Principles of biostatistics, Pagano M. & Kimberlee G. Duxbury Press
2. Statistical methods in biology, Bailey N.T.J. Cambridge Uni. press
3. Biostatistical analysis, Zar, J.H. Pearson Education
4. Fundamentals of biostatistics, Khan and Khanum, Ukaas publish.
5. Gupta S.C. and V.K. Kapoor
6. An introduction to statistical methods, C.B.Gupta and Vijay Gupta, Vikram publishing house pvt. Ltd.

5B08BTC: MOLECULAR BIOLOGY

Module I

History and development of Molecular biology- Nucleic acids - DNA and RNA as genetic materials. Structure of nucleic acids - nucleosides and nucleotides - DNA double helix. Nature of genetic code- deciphering genetic code- wobbles hypothesis

Module II

DNA replication in prokaryotes, Unit of replication, enzymes involved, replication origin and replication fork, DNA damage and repair mechanisms- photo activation - excision repair- recombination repair, gene mutations- point, frame shift- physical and chemical mutagens.

Module III

Transcription in prokaryotes and eukaryotes - transcription unit, promoter, terminator sequence- RNA polymerases, RNA processing - capping, splicing, polyadenylation, structure and functions of different types of RNA

Module IV

Translation in prokaryotes and eukaryotes- aminoacylation of tRNA, formation of initiation complex, elongation and elongation factors, termination.

Module V

Regulation of gene expression in prokaryotes- operons - negative and positive control - lac and trp operon, catabolic repression, chromatin activity and gene regulation in eukaryotes

References:

1. Cell and molecular biology- Concepts and experiments. Gerald Karp. John Wiley and sons. Inc.
2. Molecular biology of the Gene. James D Watson, Tania A Baker, Stephen P Bell, Alexander Gann, Michael Levine, Richard Losick. Pearson Education.
3. Genes IX. Benjamin Lewin. Jones and Bartlett Publishers.
4. Molecular cell biology. Lodish, Berk, Matsudara, Kaiser, Krieger, Scott, Zipursky, Darnell. W H Freeman& Co. New York.

5B09BTC: INDUSTRIAL BIOTECHNOLGY

Module I

Introduction to bioprocess engineering: Basic principles of fermentation- Types of fermentation processes, analysis of batch, fed batch and continuous fermentations. Bioreactors - Design and types of bioreactors. Measurement and control of bioprocess parameters (aeration, pH, temperature and dissolved oxygen)

Module II

Isolation, preservation and maintenance of industrial microorganisms- Applications of genetic engineering for strain improvement-Media for industrial fermentation - Media sterilization - Downstream processing - separation of solid from liquid media and purification by chromatography

Module III

Enzyme and whole cell immobilization and their industrial applications - Microbial production of enzymes (bacterial and fungal amylase) - Biotransformation

Module IV

Industrial production of acids (citric and acetic acid), antibiotics (Penicillin G), amino acids (glutamic acid) and SCP

Module V

Food and Beverage Biotechnology: Fermented food: fermented milk products - cheese, butter, and yoghurt, fermented vegetables - sauerkraut. Wines and different types of wines - factors affecting wine production. Brewing- steps involved in Beer production. Distilled liquors (brandy, rum, vodka)

Module VI

Principles of food preservation: Preservation by high temperatures, drying, food additives and radiation. Preservation of milk, meat, fish, fruits and vegetables. Food hygiene- Food sanitation, bacteriology of water and food products, food manufacturing practice and Hazard Analysis Critical Control Points (HACCP)

References:

1. Microbial Biotechnology. Fundamentals of applied microbiology. Alexander N Glazer, Hiroshi Nikalido. Cambridge Univ. Press.
2. Principles of fermentation technology. Stanbury PF, A Whitaker and S J Hall. Pergmon Press
3. Industrial microbiology. A H Patel. MacMillian.
4. Industrial microbiology. Prescott and Dunn. A V I Publishing Co USA.
5. Industrial Microbiology. L E Casida. AGE International Publications.

5B10BTC: ANIMAL CELL BIOTECHNOLGY

Module I

History and development of animal cell culture: The natural surroundings of animal cells, equipments and materials for animal cell culture technology

Module II

Primary culture: Disaggregation – mechanical and enzymatic – Cell lines- definite and continuous/transformed cell lines, their origin and characteristics. Growth kinetics of cells in culture

Module III

Culture media for animal cell culture: Physico - chemical properties of culture media- Balanced salt solutions – Natural and artificial media.

Module IV

Cell synchronization- Growth factors promoting proliferation of animal cells (EGF, FGF, PDGF, NGF and Interleukins etc.). Bioreactors for large scale culture of cells

Module V

Applications of animal cell culture- Expression of cloned proteins in animal cells (Insulin, growth hormones, interferon and t-plasminogen activator). Cell culture based production of vaccines and monoclonal antibodies

Module VI

Animal cloning: Gene transfer methods- Transgenic animals and production of useful products from transgenic animals. Transgenic animals as models for human diseases. Xeno-transplantation. Embryo transfer and its applications in cattle. Animal house practices and ethics of animal cloning.

References:

1. Culture of Animal Cells-A Manual of basic Technique; R.Ian Freshny; John Wiley and Sons, Inc., Publication.
2. Animal Biotechnology-Recent Concepts to Development; P.Ramadass, MJP Publishers
3. Animal Cell Biotechnology-Methods and Protocols; Edited by Nigel Jenkins, Humana Press, Totowa, New Jersey

5B11BTC: ENVIRONMENTAL BIOTECHNOLOGY

Module I

Renewable and non-renewable resources - Conventional fuels and their environmental impacts; Firewood, Plant and animal waste, Coal, Gas, Animal oil Modern fuels and their environmental impacts; Biogas, Bio-hydrogen, Biodiesel, Ethanol, Plant based petroleum industry

Module II

Environmental pollution-air and water pollution-source, type and effects of pollution on human beings and plants-greenhouse effect-acid rain Environmental management - air, water and soil quality management Social forestry, Bioremediation, Bioleaching, Biomonitoring, biopesticides - Thuringiensis toxin as a natural pesticide

Module III

Nitrogen fixation: Symbiotic and asymbiotic Nitogen fixing systems Leghaemoglobin and Nitrogen fixation in nature. Nitrogenase structure and chemical properties - Nif gene – organization - regulation of nif expression - nif LA operon. Plasmid mediated engineering for nitrogen fixation. Biofertilizers

Module IV

Biotechnological inputs in producing good quality natural fibres - wool, cotton and silk

References:

1. Agarwal S.K-Environmental Biotechnology-S B Nangia for APH Publishing Corporation.
2. Sharma P.D-Ecology and Environment-Rastogi Publications.
3. Santra S.C-Environmental Science-NewCentral Book Agency (P)Ltd.
4. Dr Raghavan Nambiar .K-Textbook of Environmental Studies-SCITECH publications.
5. Odum-Fundementals of Ecology.

5B12BTC: BIOTECHNOLOGY PRACTICAL III

- DNA isolation from Bacteria
- RNA isolation Liver
- Protein extraction from serum
- Spectrophotometric quantitation of DNA/RNA
- Agarose gel electrophoresis of DNA
- SDS-PAGE of proteins
- Production and characterization of wine
- Production of cheese
- Production of sauerkraut
- Production of yoghurt
- Determination of BOD of the water sample by wrinklers method
- Microbial analysis of waste water.
- Isolation of Rhizobium from legume root
- Production of biopesticides
- Production of biofertlizers

6B13BTC: GENETIC ENGINEERING

Module I

Isolation and purification of genomic DNA from bacteria, Plant and animal cells - Isolation of plasmid DNA. Extraction of RNA and mRNA purification - cDNA synthesis. Electrophoresis of DNA and RNA. Nucleic acid blotting and hybridization.

Module II

Enzymes involved in genetic engineering: Nucleases, Restriction endonucleases, Ligases, Polymerases and DNA modifying enzymes. Cloning vectors: Plasmid vectors, Phage vectors and Cosmids. Expression vectors. Introduction of DNA into living cells: Transformation and transfection, identification of transformants and recombinants. Genomic and cDNA libraries, identification of desired clone

Module III

PCR: Primer design, fidelity of thermostable enzymes, types of PCR- Multiplex, Nested, Reverse transcriptase, Real time etc., Applications of PCR. DNA sequencing methods.

Module IV

Recombinant protein production in prokaryotes and eukaryotes. Recombinant DNA in medicine: Production of recombinant insulin, human growth hormones, factor VIII, monoclonal antibodies and recombinant vaccines. DNA fingerprinting in forensic science

Module V

Genetic engineering in plants: *Agrobacterium* mediated gene transfer, direct gene transfer methods. Plant selectable markers and reporter genes. Applications of plant genetic engineering in crop improvement. Genetic engineering in animals: Gene transfer methods in animals, gene cloning vectors, gene transfer and expression of induced genes. Transgenic animal models.

References:

1. Recombinant DNA. James D. Watson, Scientific American books.
2. Gene Cloning and DNA analysis. TA Brow. Blackwell publishing.
3. Molecular Biotechnology. Bernard R Glick, ASM press.
4. Molecular Cloning Vol 1-3. Sambrook and Russell, CSHL press.
5. Recombinant DNA. Genes and Genomes. James D Watson, CSHL press.
6. Principles of gene manipulations and Genomics. SB Primrose and RM Twyman, Blackwell publishing.

6B14BTC: DEVELOPMENTAL BIOLOGY

Module I

Plant development: Microsporangium – microsporogenesis and male gametophyte – pollination, pollen structure, palynology. Megasporangium , megasporogenesis and female gametophyte, structure of male embryosac. Fertilization – pollen pistil interaction, double fertilization, triple fusion, embryo structure – dicot and monocot, polyembryony, endosperm apomixes, haploid production, parthenocarpy, parthenogenesis

Module II

Animal development: Gametogenesis ; oogenesis and spermatogenesis – gene function during gametogenesis. Fertilization – mechanism of fertilization – recognition of egg and sperm, acrosome reaction, cortical reaction, activation of egg metabolism, fusion of genetic material, rearrangement of egg cytoplasm. Cleavage and blastulation – types of cleavage, physiology of cleavage, catabolic activities, anabolic activities, blastulation, types of blastula. Gatrulation – major events of gastrulation, formative or morphogenetic movements, initiation of chemo-differentiation, chemical changes during gastrulation, nuclear activation during gastrulation, Neurulation, morphogenesis and growth – neurogenesis, notogenesis and mesogenesis, Flexion of embryo, morphogenesis – process of morphogenesis, growth – protoplasmic or subcellular growth, types of growth, differentiation – cyto-differentiation, histogenesis and organogenesis.

Module III

Concepts in development – nucleocytoplasmic interactions in development, cell-cell communication in development – induction, competence, instructive and permissive interactions, epithelial mesenchymal interactions, paracrine factors, cell surface receptors and their signal transduction (brief account), cell differentiation and differential gene expression, levels of differentiation, stem cells, role of microenvironment in differentiation, gradient and polarity, origin of anterior-posterior polarity, dorso-ventral polarity(eg. Drosophila).

References:

1. Developmental Biology, Scott F. Gilbert, Sinauer Associates, Inc. Publishers
2. Chordate Embryology – Developmental Biology, P.S.Verma and V.K.Agarwal, S.chand Publishers
3. The Embryology of Angiosperms, S.S.Bhojwani and S.P.Bhatnagar
4. Introduction to Embryology of Angiosperms, Maheswari, P.
5. Embryology, Mitchell, Elsevier

6B15BTC: PLANT BIOTECHNOLOGY

Module I
Introduction to plant Biotechnology: History and development, totipotency, nutritional medium- components of media

Module II
Callus culture: Types of callus, significance, organogenesis, somatic embryogenesis and artificial seed. Somaclonal variation and its application- cell suspension culture

Module III
Organ culture: Types of organ culture-root culture, shoot tip culture, ovary and ovule culture, embryo culture and embryo rescue

Module IV
Production of haploid plants: Anther and pollen culture, significance and production of triploids. Endosperm culture- In-vitro pollination and cryopreservation

Module V
Protoplast culture: protoplast isolation, protoplast fusion, somatic hybridization and its applications - cybrids

Module VI
Plant genetic manipulation: Gene transfer methods- Electroporation, liposome mediated and Biolistics - Agrobacterium mediated genetic transformation and transgenic plants (Abiotic & biotic stress tolerant plants and terminator gene technology). Edible vaccines from plant.

Module VII
Plant molecular markers: RFLP, RAPD, AFLP and Micro and Mini satellites. Applications of molecular markers in crop improvement and marker assisted selection

References:

1. Bains W.2004.Biotechnology from A to Z.third edition,Oxford university Pres,London.
2. Introduction to plant tissue culture ,M.K Razdan.
3. Plant tissue culture-kalyan kumar de

6B16BTC: MEDICAL BIOTECHNOLOGY

Module I

Diagnostic applications - Nucleic acid amplification methods, diagnostic sequencing and mutation detection. Molecular typing methods. Detection of bacterial pathogens, viruses and parasitic pathogens

Module II

Classification of genetic diseases-Chromosomal disorders-Numerical disorders e.g.: trisomies and monosomies-Structural disorders e.g. deletions, duplications, translocations and inversions. Chromosomal instability syndromes. Gene controlled diseases - Autosomal and X-linked disorders.

Module III

Molecular basis of human diseases- Pathogenic mutations- Gain of function mutations: Oncogenes, Huntington's disease, Pittsburg variant of α-1 antitrypsin. Loss of function - Tumor suppressor. Dynamic mutations - Fragile X - syndrome, Myotonic dystrophy.

Module IV

Prenatal diagnosis- Invasive techniques- Amniocentesis, Fetoscopy and Chorionic villi sampling-Non invasive technique- X-ray, TIFA, Maternal serum and fetal blood in maternal blood. Diagnosis using protein and enzyme markers, Monoclonal antibodies, DNA/RNA based diagnosis of Hepatitis, HIV etc., and Application of microarrays to diseases.

Module V

Gene therapy - Ex-vivo, In-vivo and In-situ gene therapy. Strategies for gene therapy. Gene therapy trials: Cancer, AIDS and neurological diseases.

References:

1. Genetics for clinicians- Shubha R.Phadke; PRISM BOOKS.
2. An introduction to Recombinant DNA in medicine- Alan E. H. Emery; John Wiley and sons
3. Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine)- Johen Decker, U. Reischl; Amazon
4. Human Molecular Genetics- T. Strachan and Andrew Read; Amazon
5. Diagnostic and therapeutic antibodies- Methods in Molecular medicine-Andrew J.T George; Humana press

6B17BTC: BIOTECHNOLOGY PRACTICAL IV

1. Plasmid isolation
2. DNA isolation from plant
3. Restriction digestion
4. DNA ligation
5. Bacterial transformation
6. DNA amplification using PCR (Demonstration)
7. Agrobacterium mediated genetic transformation
8. Plant tissue culture media preparation-MS media
9. Explant selection, sterilization and inoculation
10. Callus induction from leaf, node, shoot tip etc.
11. Direct organogenesis
12. Seed culture
13. Cell suspension culture
14. Artificial seed
15. Hardening of regenerated plants
16. Embryo disection and mounting - tridax
17. Identification of C.S. of mature anther, dicot and monocot embryos
18. Polen grains of Hibiscus, Balsum and Datura
19. Observe permanent slides of blastula and gastrula

B.Sc. BIOTECHNOLOGY
(COMPLEMENTARY) PROGRAMME
(KUCBSS-UG-2014 ADMISSION ONWARDS)

1C01BTC: ENVIRONMENTAL BIOTECHNOLOGY

Module I

Pollution - different types of pollution- air, water, and land. Monitoring the pollution. Environmental impacts of pollution - green house effects, acid rain, ozone depletion and UV radiation.

Module II

Sewage treatment process - small scale and large scale process. Primary, secondary and tertiary treatment. Solid waste disposal methods - sanitary landfills, composting, vermicomposting and biogas production.

Module III

Biodegradation of xenobiotics, Bioremediation, insitu and exsitu bioremediation, biostimulation, and phytoremediation.

Module IV

Bioresources - biodiesel, bioethanol, bioplastics, oil recovery process, Bioleaching method.

Module V

Biofertilizers – types - Nitrogen fixation - symbiotics and non symbiotics using mycorrhiza. Biopesticides - Bacillus thuringensis and Baculo virus

References:

1. Environmental Science and Biotechnology: Theory and techniques; A.G.Murugesan, C.Rajakumari; MJP Publishers.
2. Environmental Biotechnology; Alan Scragg; Oxford University Press.
3. Environmental Biotechnology; M.H.Fulekar; Oxford & IBH Publishing Co. Pvt. Ltd.

2C02BTC: FOOD BIOTECHNOLOGY

Module I

History and scope of food fermentation: Primary and secondary fermentation. Fermented beverages-Wines and different types of wines - factors affecting wine production. Brewing- steps involved in Beer production. Distilled liquors (brandy, rum, vodka)

Module II

Fermented food: fermented milk products - cheese, butter, and yoghurt, fermented vegetables - sauerkraut. Bread and other indigenous fermented foods (Idly). Yeast as food and fodder. Single cell protein - spirullina.

Module III

Principles of food preservation: Maintenance of anaerobic condition - high temperature and low temperature storage, drying, food additives, chemicals, irradiation and Pascalization. Preservation of milk, meat, fish, fruits and vegetables.

Module IV

Food spoilage: Risk factors associated with food borne illness. Spoilage of milk, canned food, fruits and vegetables.

References:

1. Microbial Biotechnology. Fundamentals of applied microbiology. Alexander N Glazer, Hiroshi Nikalido. Cambridge University Press.
2. Principles of fermentation technology. Stanbury PF, A Whitaker and S J Hall. Pergmon Press
3. Fermentation microbiology and biotechnology. E M T. E I- Mansi, C F A Bryee, A L Demain and A R Allman.
4. Industrial microbiology. A H Patel. MacMillian.
5. Bioprocess technology. P T Kalaichelvan, I Arun Pandi. MJP publishers.
6. Industrial microbiology. Prescott and Dunn. A V I Publishing Co USA.
7. Biotechnology. A textbook of Industrial Microbiology. Wulf Crueger and Annelies Crueger. Panima Publishing Co.
8. Industrial Microbiology. L E Casida. AGE International Publications.
9. Industrial Microbiology: An Introduction. Michael J Waites, Neil L Morgan, John S Rockey, Gary Higton. Blackwell science.
10. Food Biotechnology-S.N Tripathy - Dominant pub

3C03BTC: PLANT BIOTECHNOLOGY

Module I

Introduction to plant Biotechnology: History and development, totipotency, nutritional medium- components of media, growth regulators and control of growth and differentiation of plant cells in culture

Module II

Callus culture: Types of callus, organogenesis, somatic embryogenesis and artificial seed. Somaclonal variation and its application, single cell culture- methods, cell suspension culture, growth kinetics of cells in cell suspension, Organ culture: root culture, shoot tip culture, ovary and ovule culture, embryo culture and embryo rescue, Production of haploid plants: Anther and pollen culture, significance and production of triploids. Endosperm culture- In-vitro pollination and in vitro fertilization, germplasm conservation and cryopreservation, Protoplast culture: protoplast isolation, protoplast fusion, somatic hybridization and its applications-hybrid and cybrid

Module III

Plant DNA Purification: Extraction of Plant genomic DNA and RNA-Electrophoresis-Nucleic acid blotting and Hybridization (Southern and Northern), Genetic engineering tools: Restriction digestion, DNA ligation and Polymerisationn - Cloning vectors (Plasmids, Phagemids and Cosmids) - Taransformation and identification of transformants and recombinants.

Module IV

Identification and isolation of plant genes: Genomic and cDNA libraries. PCR: Basic principle and applications. DNA sequencing, Plant genetic manipulation: Gene transfer methods in plants - Electroporation, liposome mediated, Gene gun - Agrobacterium mediated genetic transformation. Transgenic plants and its applications

References:

1. Recombinant DNA. James D. Watson, Scientific American books.
2. Gene Cloning and DNA analysis. TA Brown. Blackwell publishing.
3. Molecular Biotechnology. Bernard R Glick, ASM press.
4. Molecular Cloning Vol 1-3. Sambrook and Russell, CSHL press.
5. Recombinant DNA. Genes and Genomes. James D Watson, CSHL press
6. Plant tissue culture; Kalyan Kumar De; New Central Book Agency (P) Ltd.

4C04BTC: BIOTECHNOLOGY PRACTICAL

1. Determination of BOD of the water sample by wrinklers method
2. Determination of DO of the water sample
3. Microbial analysis of waste water.
4. Isolation of Rhizobium from legume root
5. Production of biofertlizers
6. Study of biopesticides using *Trichoderma*
7. Production and characterization of wine
8. Production of cheese
9. Production of sauerkraut
10. Production of yoghurt
11. Production of beer
12. Production of Pickles
13. Plant tissue culture media preparation-MS media
14. Explant selection, sterilization and inoculation
15. Callus induction from leaf, node, shoot tip etc.
16. Direct organogenesis
17. Artificial seed
18. Isolation of Plant genomic DNA
19. Agarose gel electrophoresis of DNA
20. Spectrophotometric quantitation of DNA
21. RNA isolation from plant (TRI solution method)
22. Agrobacterium mediated genetic transformation

B.Sc. BIOTECHNOLOGY
OPEN COURSES
(KUCBSS-UG-2014 ADMISSION ONWARDS)

(Among Two Open Courses Only One Can Be Offered)

5D01BTC: ENVIRONMENTAL SCIENCE (OPEN COURSE)

Module I

Environmental Pollution and control-Air, water and soil pollution-Cause, effect, disease associated and control measures. Greenhouse effect, Acid rain, Biomagnification

Module II

Bio-fuels - Renewable and nonrenewable fuels, Biogas, Hydrogen as a fuel, Biodiesel, Bio-ethanol, solar energy converters.

Module III

Waste management, -e-waste management, Waste water treatment-primary, secondary and tertiary treatment, Solid waste management-Vermicomposting, landfills, and incineration

References:

1. Sharma P.D-Ecology and Environment-Rastogi Publications
2. Sathyanarayanan -Biotechnology
3. Singh B.D-Biotechnology

5D02BTC: FERMENTATION TECHNOLOGY (OPEN COURSE)

Module I

Fermentation - Definition and scope. Bioreactor-Basic components and function. Submerged and surface fermentation - Batch and Continuous Fermentation, Solid and liquid Fermentation.

Module II

Fermented food and beverages-Bread, Cheesse, Yoghurt, Sauerkraut, Wine, Beer, Vinegar. Probiotc food

Module III

Production of microbial enzymes and its importance - Protease and Amylase. Brief account of Enzyme technology - immobilization of enzymes and Biosensors

References:

1.Sathyanarayan -Biotechnology
2.Frazier -Food Microbiology

MODEL QUESTION PAPER

KANNUR UNIVERSITY
1st SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
1B01BTC: CELL BIOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. What are secondary lysosomes?
2. Comment on nucleosome
3. Differentiate plant and animal cell
4. Mention the functions of peroxisome
5. Write a note on nucleolus
6. What is synapsis?

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Write short notes on salivary gland chromosome
8. Explain various types of ribosomes
9. Describe flagellar locomotion
10. Schematically represent the different stages of cell cycle
11. Describe the structure of microtubules

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

12. Give an account on the structure and functions of mitochondria
13. What are the stages in meiosis I
14. Describe the structure of chromosome
15. Write a note on origin of life

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Discuss the stages of mitosis. Write a note on its significance.
17. Describe the ultra structure of plasma membrane.
18. Give an account on the structure and functions of Golgi bodies.
19. Give an account on chromosome structure and organisation

KANNUR UNIVERSITY

IIst SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014

(KUCBCSS)

2B02BTC: GENETICS

(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A

Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.

(6x1 = 6 marks)

1. Penetrance
2. Holandric genes
3. Test cross
4. Pleotropism
5. Linkage
6. Trisomy

Section B

Write Short notes on any three of the following. Each question carries 2 marks.

(3x2 = 6 marks)

7. Inheritance of X-linked genes
8. Law of independent assortment
9. Sex influenced characters
10. Inter-allelic interactions

Section C

Write short essay on any three of the following. Each question carries 4 marks.

(3x4 = 12 marks)

11. Hardy-Weinberg law
12. Linkage mapping
13. Turners" syndrome
14. Cytoplasmic inheritance
15. Explain multiple allelism with ABO blood group as example

Section D

Write essay on any two of the following. Each question carries 8 marks.

(2x8 = 16 marks)

16. Explain various chromosomal mechanism of sex determination
17. Describe intergenic interactions with examples
18. Give an account on structural aberrations of chromosomes
19. Explain the mechanism of crossing over and factors affecting crossing over

KANNUR UNIVERSITY
III[rd] SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
3B03BTC: IMMUNOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Epitope
2. Opsonin
3. Monoclonal antibodies
4. Monocyte
5. Haptens
6. Cytokines

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Role of adjuvants in increasing immune response
8. Thymic selection
9. Distinguish between class I and class II MHC molecule
10. Forces involved in antigen-antibody interactions

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Innate immunity mechanisms
12. Explain the mechanism of inflammatory response
13. What is complement? Describe the biological functions of complement
14. Explain the pathway of endogenous antigen presentation
15. Mechanism of allograft rejection

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Describe the structure and functions of secondary lymphoid organs
17. Describe the structure and functions of immunoglobulins
18. Explain the role of T lymphocytes in immunity
19. Describe various types of hypersensitivity reactions

KANNUR UNIVERSITY
III[rd] SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
3B04BTC: PLANT PHYSIOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Water potential
2. Vernalization
3. Arc auxanometer
4. Quiescence
5. Gravitropism
6. HSPs

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Mechanism of Stomatal movements
8. Differences between Pr and Pfr
9. Patterns of plant growth
10. Account on micro and macro elements

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Plant movements
12. Chilling injury and High temperature stress
13. Biological clock
14. Photoperiodism
15. Growth kinetics

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Detail on Dormancy and its breaking
17. Significance of Plant growth hormones
18. Account on Photomorphogenesis
19. Translocation in phloem.

KANNUR UNIVERSITY
III[rd] SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
3A07BTC: BASIC BIOPHYSICS
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Topoisomerase
2. .Emulsion
3. Order and molecularity
4. Activation energy
5. Fluid mosaic model
6. Aquaporins

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Hoogsteen base pairing
8. Random structures in proteins
9. Ribozyme
10. Osmosis

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Surface tension
12. DNA protein interaction
13. Passive transport
14. .Adsorption
15. Collision theory

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Conformation of oligosaccharides and polysaccharides
17. Bioelectric properties of membrane
18. Biophysical structure of nucleic acids
19. Explain in detail about the structure & components of plasma membrane

KANNUR UNIVERSITY
III[rd] SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
3A08BTC: BIOSTATISTICS
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Histogram
2. ANOVA
3. Mutually exclusive events
4. Variance
5. Discrete data
6. Kurtosis

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Absolute and relative measures
8. Cumulative frequency distribution
9. Stem and leaf chart
10. Primary and secondary data

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Measures of central tendency
12. Laws of probability
13. Calculate the standard deviation and coefficient of variation for the following data of length (mm) of aquarium fishes

Length	0-6	6-12	12-18	18-24	24-30	30-36
No. of fish:	4	8	16	9	5	3

14. Compute the mean for the following data on the number of children Per family

No. of children/family:	1	2	3	4	5	6	7	8	9
Frequency :	2	60	101	152	205	1	55	79	40	1

15. Test of significance

Section D

Write essay on any two of the following. Each question carries 8 marks.

(2x8 = 16 marks)

16. Compute Karl Pearson's coefficient of correlation for the following data Length (X in cm) and weight (Y in g) of goldfish. Test its significance

X :	7	5	6	3	4	2	4	8	5
Y :	26	18	20	9	12	8	13	30	16

17. Explain the uses of Scatter diagram and correlation graph in the study of the relationship between two variables
18. Enumerate the properties of symmetrical, positively and negatively Skewed distributions
19. One bag contains 4 white and 2 black ball and another bag contains 3 White balls and 5 black balls. If one ball is drawn from each bag find the probability that (i) both are white, (ii) both are black, (iii) one is white and one is black.

KANNUR UNIVERSITY

IVth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014

(KUCBCSS)

4B06BTC: ANIMAL PHYSIOLOGY

(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A

Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.

(6x1 = 6 marks)

1. Tubular secretion
2. Hypothalamus and its functions
3. Smooth and striated muscles
4. ECG
5. Pancreas
6. Blood groups in man

Section B

Write Short notes on any three of the following. Each question carries 2 marks.

(3x2 = 6 marks)

7. Fossa ovalis
8. Purkinje fibers
9. Nephron
10. Plasma proteins

Section C

Write short essay on any three of the following. Each question carries 4 marks.

(3x4 = 12 marks)

11. N K cells
12. Hormones of pituitary
13. Pancreatic hormone
14. Neurotransmitter systems
15. Detection of Blood pressure

Section D

Write essay on any two of the following. Each question carries 8 marks.

(2x8 = 16 marks)

16. Comment on the factors involved in Blood clotting

17. Describe Cardiac Cycle and Cardiac output

18. Explain the mechanism of respiration and gas exchange in the lungs

19. Write essay in Gastro Intestinal hormones, its action and regulation

KANNUR UNIVERSITY

IVth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
4A09BTC: METHODOLOGY AND PERSPECTIVE OF SCIENCE
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Empiricism
2. Auxiliary hypothesis
3. Corroboration
4. Repeatability
5. Scientific temper
6. Pseudoscience

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Principle of spectrophotometry
8. Accuracy and precision
9. Experimental bias
10. Plagiarism

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Basis of scientific laws
12. Differentiate between inductive and deductive hypothesis
13. Significance of control in experiments
14. Autoradiography and its applications
15. Importance of models in science

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Explain various blotting techniques and its applications
17. Use of statistical tools in data analysis
18. Depositories of scientific information
19. Reporting of experimental data

KANNUR UNIVERSITY

IVth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
4A10BTC: INFORMATICS & INTRODUCTION TO BIOINFORMATICS
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. CPU
2. Wireless technology
3. e-governance
4. Proteomics
5. Z form DNA
6. BLAST

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. INFLIBNET
8. Information overload
9. Green computing
10. Biological database

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Cyber issues.
12. Peripherals of computer
13. Human genome
14. Nucleic acid sequencing
15. Proteomics

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Virtual reality.
17. Objectives and applications of Human Genome Project.
18. Sequence allignment.
19. Cyber issues

KANNUR UNIVERSITY

Vth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
5B08BTC: MOLECULAR BIOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. What are point mutations?
2. What are repressor proteins?
3. Differentiate leading and lagging strand
4. Comment on catabolic repression
5. What are the functions of rRNA
6. What is wobble hypothesis?

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. What are the components of transcription unit
8. Briefly explain Rho dependent termination?
9. Write a note on self splicing
10. What are the steps in 5' capping
11. Explain the structure of eukaryotic promoter

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

12. Describe transcriptionally active chromatin
13. What are the enzymes involved in DNA replication
14. Explain the structure and functions of tRNA
15. What is attenuation? How trp operon is regulated by attenuation?

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Discuss the various stages of transcription in prokaryotes
17. Define operon. Describe the control of lac operon in prokaryotes
18. Explain the different repair mechanisms
19. Discuss the various stages of translation

KANNUR UNIVERSITY
Vth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
5B09BTC: INDUSTRIAL BIOTECHNOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Write an account on SCP.
2. What is downstream processing?
3. Comment on HACCP.
4. Write notes on immobilized enzymes.
5. Describe biotransformation.
6. What is freeze drying?

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Write short notes on brewing.
8. What is food preservation? Write the significance of preservation in food industry.
9. Briefly discuss the concept of food hygiene.
10. Highlight the industrial applications of immobilized enzymes.
11. Write an account on fermented vegetables.

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

12. Give an account on the various types of fermentation processes.
13. Discuss the role of genetic engineering in strain improvement.
14. Describe the microbial production of amylase.
15. What is SCP? Write an account on the synthesis and significance of SCP.

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. What are fermented foods? Explain the various fermented milk products and their significance in food industry.
17. Describe the principles of food preservation. What are the various methods of food preservation?
18. Explain the design of bioreactors. Briefly discuss the measurement and control of bioprocess parameters.
19. Write an essay on industrial production of acids and antibiotics

KANNUR UNIVERSITY

Vth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
5B10BTC: ANIMAL CELL BIOTECHNOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. What are monoclonal antibodies?
2. Comment on bioreactors.
3. Write short notes on NGF.
4. What do you mean by xenotransplantation?
5. What is BSS?
6. Write an account on recombinant insulin

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Write short notes on embryo culture.
8. Briefly discuss the ethical aspects of animal cloning.
9. Write notes on growth kinetics of cells in culture.
10. Differentiate between primary cell lines and transformed cell lines.
11. Describe the significance of EGF and FGF in animal cell culture.

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

12. Give an account on the synthesis of TPA in animal cell culture.
13. What are transformed cell lines? Discuss their significance.
14. Explain the various gene transfer methods employed in cell cultures.
15. Discuss the physico chemical properties of culture media.

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. What are monoclonal antibodies? Highlight the significance of monoclonal antibodies in the field of medicine and healthcare.
17. Write an essay on animal cloning. Discuss the various gene transfer methods and significance of cloning.
18. What are growth factors? List the various growth factors promoting proliferation of animal cells in culture.
19. Describe the concept of cell lines. Discuss the various types of cell lines and its applications in Biotechnology.

KANNUR UNIVERSITY

Vth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
5B11BTC: ENVIRONMENTAL BIOTECHNOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Biogas
2. Biofarming
3. Greenhouse effect
4. Acid rain
5. Leg haemoglobin
6. Social forestry

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Bioleaching
8. Biodiesel
9. Plant and animal waste as fuel
10. Hydrogen as modern fuel

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Bioremediation
12. Cause and effect of air pollution
13. Soil quality management
14. Cause and effect of water pollution
15. Microbiological examination of water quality

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Explain in detail about modern fuels and their environmental effects
17. Explain in detail about symbiotic Nitrogen fixation
18. Explain in detail about air quality management
19. Explain in detail about Biotechnological inputs in producing good quality natural fibers

KANNUR UNIVERSITY

VIth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
6B13BTC: GENETIC ENGINEERING
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Comment on alkaline lysis method
2. What is blue-white screening?
3. Comment on automated DNA sequencing
4. Write note on Fusion proteins
5. Comment on Ti plasmid
6. Highlight the features of Taq DNA polymerase

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Write short notes on Electrophoresis of DNA
8. What are restriction endonucleases? Write the significance
9. Briefly discuss the methodology of recombinant protein production in E.coli
10. Differentiate between transformation and transfection
11. Describe Sanger-coulson method of DNA sequencing

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

12. Give an account on the construction of genomic and cDNA library
13. What are transgenic animals? Discuss transgenic animal models
14. Discuss the potential use of recombinant DNA in medicine
15. Highlight the salient features of plasmid vectors

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Explain agrobacterium mediated genetic transformation in plants. Discuss the various applications of transgenic plants
17. Describe the concept of PCR. Discuss the various types of PCR and its applications in Biotechnology
18. Give an account on the various enzymes involved in recombinant DNA technology
19. Discuss the various protocols used for isolation and purification of nucleic acids from living cells

KANNUR UNIVERSITY

VIth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014

(KUCBCSS)

6B14BTC: DEVELOPMENTAL BIOLOGY

(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A

Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.

(6x1 = 6 marks)

1. Palynology
2. Apomixis
3. Parthenocapy
4. Fate map
5. Notogenesis
6. Spermiogenesis

Section B

Write Short notes on any three of the following. Each question carries 2 marks.

(3x2 = 6 marks)

7. Acrosomal reactions
8. Role of microenvironment in stem cell differentiation
9. Epithelial-mesenchymal interactions
10. Characteristic features of cleavage

Section C

Write short essay on any three of the following. Each question carries 4 marks.

(3x4 = 12 marks)

11. Explain the mechanism of blockage to polyspermy
12. Describe different types of growth
13. Explain the process of fertilization in plants
14. Factors responsible for determining anterior-posterior polarity in Drosophila
15. Induction and competence

Section D

Write essay on any two of the following. Each question carries 8 marks.

(2x8 = 16 marks)

16. Explain the genetic basis of cell differentiation
17. Describe the different phases of oogenesis
18. Describe the structure of megasporangium and explain the process of megasporogenesis
19. Explain the nucleo-cytoplasmic interactions in development

KANNUR UNIVERSITY
VIth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
6B15BTC: PLANT BIOTECHNOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Totipotency
2. Organ culture
3. Pytohormones
4. Artificial seeds
5. Kinetin
6. Cybrid

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Gene transfer methods
8. Significance of anther culture
9. Triploid culture
10. Banana vaccine

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Organogenesis
12. Growth regulators
13. Meristem culture and its importance
14. Cryopreservation
15. Cell suspension culture

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Explain genetic engineering in plants using *Agrobacterium tumefecians*
17. Explain the process of protoplast isolation and culture for somatic hybridisation.
18. Application of molecular markers in crop improvement & marker assisted selection.
19. Explain in detail about different types of stress tolerant plants.

KANNUR UNIVERSITY

VIth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
6B16BTC: MEDICAL BIOTECHNOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Define TIFA
2. What is meant by Single Stranded Confirmation Polymorphism
3. Comment on α-1 antitrypsin
4. Write note on ligation mediated diagnosis
5. Comment on trisomies
6. Highlight the features of molecular typing

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Write short notes on X-linked disorders
8. What are various applications of DNA arrays in molecular medicine
9. Briefly discuss the molecular basis and diagnosis of myotonic dystrophy
10. Differentiate between gain of function and loss of function mutations
11. Describe molecular diagnosis of Huntingtons disease

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

12. Give an account on the use of antisense RNA in medicine
13. What are the different types of chromosomal disorders
14. Discuss the potential use of PCR for the detection of bacteria from clinical samples
15. Highlight the features of therapeutic antibodies

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8=16 marks)

16. Explain the strategies of gene therapy. Discuss two examples of gene therapy trials
17. Discuss the various tools used in prenatal diagnosis. Give an account on the prenatal diagnosis of Hepatitis
18. Give an account on the molecular pathology of Cancer
19. Discuss the significance of PCR in diagnostic applications

COMPLEMENTARY COURSES

KANNUR UNIVERSITY
I SEMESTER B.Sc. (CBSS) DEGREE EXAMINATION, 2014
Complementary Course
1C01BTC: ENVIRONMENTAL BIOTECHNOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Biogas
2. Biofarming
3. Greenhouse effect
4. Acid rain
5. Leg haemoglobin
6. Social forestry

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Bioleaching
8. Biodiesel
9. Plant and animal waste as fuel
10. Hydrogen as modern fuel

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Bioremediation
12. Cause and effect of air pollution
13. Soil quality management
14. Cause and effect of water pollution
15. Microbiological examination of water quality

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Explain in detail about modern fuels and their environmental effects
17. Explain in detail about symbiotic Nitrogen fixation
18. Explain in detail about air quality management
19. Explain in detail about Biotechnological inputs in producing good quality natural fibers

KANNUR UNIVERSITY
II SEMESTER B.Sc. (CBSS) DEGREE EXAMINATION, 2014
Complementary Course
2C02BTC: FOOD BIOTECHNOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Comment on UHT method of sterilization.
2. What is MBRT?
3. What is putrifaction?
4. Define saccharification process.
5. What is mean by simmering?
6. Comment on the importance of hops in brewing?

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. Describe canning.
8. What is mean by cold storage?
9. Name the organisms involved in sauerkraut fermentation.
10. What are still wines?

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Write a note on preservation of milk.
12. What is mean by smoking of food?
13. What are the factors affecting wine production?
14. What is mean by leavening of bread?
15. What are single cell proteins? Give two examples.

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Describe the production of beer.
17. Describe the steps involved in the production of baker's yeast? Explain its industrial importance.
18. What are the risk factors involved in food borne illnesses?
19. Give an account of fermented dairy products.

KANNUR UNIVERSITY
III SEMESTER B.Sc. (CBSS) DEGREE EXAMINATION, 2014
Complementary Course
3C03BTC: PLANT BIOTECHNOLOGY
(2014 Admission)

Time: 3 Hrs **Maximum marks: 40**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(6x1 = 6 marks)

1. Differentiate cybrid and hybrid
2. What are triploid plants
3. Define totipotency
4. Comment on significance of callus culture
5. What is in-vitro fertilization
6. Write the importance of meristem culture

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

7. What are the applications of somaclonal variations
8. Explain the protoplast culture methods
9. Give an account on growth regulators and control of growth of plant cells in culture
10. Comment on synthetic seed

Section C
Write short essay on any three of the following. Each question carries 4 marks.
(3x4 = 12 marks)

11. Explain induction and development of somatic embryoids
12. What is cell suspension culture? Explain the growth phases of cells in cell suspension culture
13. Describe the production of haploid plants
14. What are components of plant tissue culture media
15. Comment on endosperm culture

Section D
Write essay on any two of the following. Each question carries 8 marks.
(2x8 = 16 marks)

16. Explain somatic hybridization and its applications
17. Define organ culture. Describe the types of organ culture
18. Explain the steps involved in cryopreservation
19. Discuss the history and development of plant tissue culture

OPEN COURSES

KANNUR UNIVERSITY
Vth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
Open course
5D01BTC: ENVIRONMENTAL SCIENCE
(2014 Admission)

Time: 2 Hrs **Maximum marks: 25**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(5x1 = 5 marks)
:

1. Incineration
2. Methanogens
3. Air pollutant
4. CFCs
5. Gasahol

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

6. e-waste
7. Algal bloom
8. Septic tank
9. Solar cell
10. Greenhouse effect

Section C
Write Short notes on any two of the following. Each question carries 3 marks.
(2x3 = 6 marks)

11. Acid rain
12. Vermicomposting
13. Biogas
14. Air borne diseases

Section D
Write Short notes on any one of the following. Each question carries 8 marks.
(1x8 = 8 marks)

15. Explain in detail the cause and effect of environmental pollution and measures to control it
16. Give an account on waste water treatment
17. Give an account on modern fuels and their advantage

KANNUR UNIVERSITY
Vth SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION, 2014
(KUCBCSS)
Open course
5D02BTC: FERMENTATION TECHNOLOGY
(2014 Admission)

Time: 2 Hrs **Maximum marks: 25**

Section A
Write about each of the following in 2 or 3 sentences. Each question carries 1 mark.
(5x1 = 5 marks)
:

1. Malting
2. Saccharomyces cerevisiae
3. Sparger
4. Blue cheese
5. Acetobacter

Section B
Write Short notes on any three of the following. Each question carries 2 marks.
(3x2 = 6 marks)

6. Bread
7. Protease
8. Sauerkraut
9. Batch fermentation
10. Balsamic vinegar

Section C
Write Short notes on any two of the following. Each question carries 3 marks.
(2x3 = 6 marks)

11. Immobilization of enzymes
12. Yoghurt
13. Biosensors
14. Solid substrate fermentation

Section D
Write Short notes on any one of the following. Each question carries 8 marks.
(1x8 = 8 marks)

15. Explain in detail about Beer brewing
16. Give an account on types and production of wine
17. Give a detailed account on Bioreactor with the help of a diagram