S.P.MANDALI'S

RAMNARAIN RUIA AUTONOMOUS COLLEGE

DEPARTMENT OF BIOTECHNOLOGY

TYBSC INTERNAL TEST SYLLABUS

2020-2021 ODD SEMESTER

RUSBTK501

UNIT I- Cell cycle and programmed cell death- Overview of cell cycle, Components of cell cycle control system, intracellular control of cell cycle events, Mechanics of cell division- overview of M phase, mitosis and cytokinesis

UNIT II- Cell signaling and signal transduction: Introduction General Principles of Cell Signaling

UNIT IV- Cell permeability, principles of membrane transport, Transporters and channels; Active transport, passive transport, types of transporters, types of ATP driven Pumps, Na+ K+ pump.

RUSBTK502

UNIT I- Biochemical pathway for Synthesis and regulation of carbohydrates in Bacteria – Peptidoglycan Plants – starch and sucrose

UNIT II- Protein structure: Protein Tertiary and Quaternary Structures, Details of Protein purification

UNIT III- Introduction to endocrinology- mechanism of action of group I and group II hormones, coordination of functions by chemical messengers, chemical structure and synthesis of hormones, hormone secretion, transport and clearance from blood. Anterior Pituitary hormones and their control by hypothalamus: functions, regulation and abnormalities in growth hormones

UNIT IV- Posterior pituitary gland and its relation to hypothalamus

RUSBTK503

UNIT I- Enzymes- Sources, types, mode of action and applications of Restriction endonucleases DNA polymerases, Ligases, Kinases, Phosphatases, Terminal transferases, Reverse transcriptases and Nucleases

UNIT II- Sequencing: Maxam Gilbert's method, Sanger's dideoxy method, Automated DNA sequencing, Pyrosequencing

UNIT III- Genetic mapping in bacteria by conjugation, transformation and transduction.

UNIT IV- Human genome mapping and its implications in health and disease Mechanisms and application: RNAi, ZNF (Zinc finger nucleases), TALENS(Transcription activator like effector nucleases) CRISPR cas system

RUSBTK504

UNIT I- Milk: Normal flora, changes in raw milk, enumeration. Preservation methods, Pasteurisation. Starter Cultures, Fermented products- Production process and spoilage- Cheese

UNIT III- Introduction of DSP, Foam separation, Types of Precipitation, Filtration, Centrifugation, Chromatography in DSP, Cell disruption- physical and chemical methods. Solvent recovery

UNIT IV- Brewing: Overview, Role of multinational companies, microbreweries and craft breweries, Development of new wine industries, Rise of flavoured alcoholic beverages, Calorie counting and health perception, organic and biodynamic production, Use of GM crops and microorganisms

RUSBTK505

UNIT I- Introduction to crime, Sociological aspects of crime and criminals in society. Types of crime and its causes – property crimes, public order crimes, violent crimes, cybercrimes, juvenile delinquency. Introduction to Forensic science – nature, need and function, history of forensic science and scope. Criminal behaviour - Theories and literature studies, criminal inheritance and factors responsible

UNIT II- Types of crime scenes – primary, secondary, crime scenes based on size of evidence. Forensic Scientists, Investigating officers and their assigned role and duties, Modus operandi. General crime scene procedures and their management, Crime Scene survey, Crime Scene Documentation

UNIT III- Footprints and shoe-prints: Importance, Gait Pattern, casting of footprints in Different medium, Taking Control samples. Lip Prints- Nature, Location, collection and evaluation, taking control samples, Forensic Significance. Bite Marks- Nature, Location, collection and evaluation, taking control samples, Forensic Significance. Ear Prints- Nature, Location, collection and evaluation, taking control samples, Forensic Significance.

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SYBSc INTERNAL CLASS TEST SYLLABUS (2020-2021) ODD SEMESTER

PAPER CODE	UNIT NO	TOPIC FOR INTERNAL CLASS TEST
PAPER I RUSBTK301	I	**Introduction to Optics and Lasers:** ***Optics :*** Properties of Light - Reflection, Refraction, Dispersion, Interference. ***Lasers :*** Properties of Lasers, Stimulated Emissions, Laser Action; Applications of Laser
	II	**Heat, Sound, Magnetism and Fluid Dynamics** Heat: Concept of Temperature; Modes of Heat Transfer; Measuring Temperature; Platinum Resistance Thermometer; Thermocouple and Thermistors. Sound: Types of Sound Waves Audible, Ultrasonic and Infrasonic Waves; Doppler Effect; Applications of Ultrasonic Waves.
	III	**Electrophoresis:** Migration of Ions in an applied electric field; Factors affecting Electrophoretic Mobility; Moving Boundary Electrophoresis; Paper Electrophoresis; AGE; Native and SDS PAGE (reducing and nonreducing, continuous and discontinuous)
PAPER II RUSBTK302	I	**Classical methods of analysis** **Gravimetric analysis:** Introduction to gravimetric analysis, types of gravimetric analysis, conditions for a reaction to be used in gravimetric analysis, solubility and solubility product, factors affecting solubility: temperature, common and diverse ion effect, pH, nature of the solvent, complexation. Unit operations in gravimetric analysis, precipitation, homogeneous and heterogeneous precipitation, relative supersaturation, nucleation and crystal growth, their effect on particle size, Ostwald's ripening, impurities associated with precipitate formation, filtration, washing of the precipitate, drying and incineration, use of thermal methods. **Titrimetric analysis** Introduction to titrimetric analysis, conditions for a reaction to be used in titrimetric analysis, terms involved: titrant, titrand,

		indicator, equivalence point, endpoint, titration error, types of titrations. **Acid –base titrations** **Acid –base titrations** Acid base indicators, theory of acid base indicators, conditions for choosing an indicator. Types of acid base titrations, titration curves. Construction of the titration curves and the choosing of the indicator for A)strong acid –strong base B) strong acid –weak base C) weak acid – strong base D) weak acid –weak base
	II	Chemistry of water Water as a natural resource: Physical and Chemical properties of water, significance of water as a universal solvent and its properties viz. pH, Dielectric constant, boiling point. Anomalous behavior of water. Hydrological cycle.
	III	**Green Chemistry & Nanomaterials** **Green Chemistry and Synthesis:** Introduction to Green Chemistry; Need and Relevance of Green Chemistry; Principles of Green Chemistry. Green Synthesis in Industry: Green Materials, Green Reagents, Green Solvents and Green Catalysts.
PAPER III RUSBTK303	I	**Effectors of Immune Response** Hematopoiesis; Complement System- Classical, Alternate and Lectin; Regulation and Biological Effects of Complement System; Deficiencies of Complement System
	II	**Antigen antibody interaction techniques- Precipitation Reactions:** Immunoprecipitation, Immunoelectrophoresis, CIEP, Rocket Electrophoresis and 2-D Immunoelectrophoresis **Agglutination Reactions:** Passive, Reverse Passive, Agglutination Inhibition.
	III	RIA, ELISA, Immunofluorescence. Western Blot
PAPER IV RUSBTK304	I	**Cytoskeleton:** Overview of the Major Functions of Cytoskeleton. Microtubules: Structure and Composition MAPs: Functions- Role of Mitosis, Structural Support and Cytoskeleton Intracellular Mobility.

		Motor Proteins: Kinesins, Dynein; MTOCs. Dynamic Properties of Microtubules. Microtubules in Cilia and Flagella.
	II	Uptake of Nutrients by Prokaryotic Cells; Overview of membrane functions.
	III	**Cytogenetics:** Structure of Chromosome- Heterochromatin, Euchromatin, Polytene Chromosomes. Variation in Chromosomal Structure and Number: Deletion, Duplication, Inversion, Translocation, Aneuploidy, Euploidy and Polyploidy and Syndromes- Klinefelter, Turner, Cri-du-chat, Trisomy -21, Trisomy 18 and Trisomy 13.
PAPER V RUSBTK305	I	**Gene Expression – Transcription** Gene Expression- an Overview. Transcription Process in Prokaryotes: RNA Synthesis; Promoters and Enhancers; Initiation of Transcription at Promoters; Elongation and Termination of an RNA Chain. Transcription in Eukaryotes Transcription of Protein Coding Genes by RNA Polymerase
	III	**Regulation of Gene Expression** In prokaryotes: In Bacteria: *Lac* operon of *E. coli*, *trp* Operon of *E. coli*
PAPER VI RUSBTK306	I	Microorganisms in Industrial Processes Types of Microorganisms used in Industrial Processes: Bacteria, Fungi, Algae (Microalgae, Macroalgae & Cyanobacteria), Potentials & Challenges
	III	**Microbiology of water** Introduction to aquatic microbiology, Distribution of aquatic environment, Types of microorganisms. Microbiology of potable water a.Introduction – Definition & characteristics, standards, demand & use, various sources, water borne diseases. b. Analysis of potable water – Physical, Chemical & Biological parameters.
PAPER VII RUSBTK307	I	**Introduction to Research Methodology and Research Problem**

		Meaning of Research; Objectives of Research; Motivation in Research; Types of Research; Research Approaches; Significance of Research; Research Methods versus Methodology
	II	**Research Design, Data Collection Interpretation and Report Writing** Meaning of Research Design; Need for Research Design; Features of a Good Design; Important Concepts Relating to Research Design; Different Research Designs; Basic Principles of Experimental Designs; Developing a Research Plan- Collection of Primary Data; Observation method.

MSc Part II INTERNAL CLASS TEST SYLLABUS (2020-2021)

ODD SEMESTER

PAPER CODE	UNIT NO	TOPIC FOR INTERNAL CLASS TEST
PAPER 1 - RPSBTK301		
	I	***Plant tissue culture I*** Introduction to primary and secondary metabolism, important pathways leading to biosynthesis of secondary metabolites in plants,
	II	***Plant tissue culture II*** Cryopreservation -Principle and types. Germplasm conservation
	III	***Animal tissue culture I*** Biology of cultured cells, Culture vessels, Culture Media, Microbial contamination, cross contamination. Cryopreservation
PAPER 2 - RPSBTK302		
	I	***Cytogenetics*** Structure of chromosome, karyotyping, banding
	II	***Medical microbiology*** Nosocomial- S.pyogenes, Fungal-Candidiasis. Parasitic: Malaria

	III	***Molecular diagnostics*** Introduction to molecular diagnostics, pros and cons, importance, molecular techniques, amplification based techniques (probe, signal and target amplification).
	IV	***Biofilms*** Biofilms in medicine: Outline specifications: Stages in biofilm formation, Quorum sensing
PAPER 3 - RPSBTK303		
	I	***Introduction to GMOs*** Genetically modified microorganisms, examples and methods, Humulin, ice minus bacteria, GM bacteria in bioremediation
	II	***GMO crops*** GE crops' Arabidopsis as a model plant for studies in genetic engineering; Protocols on food and feed safety assessments, acute oral safety study in rats and mice
	III	***Solid waste management*** Solid waste management, Pollution Indicators, Bio indicators
PAPER 4 - RPSBTK304		
	I	***Human Embryonic development*** Human Embryonic development: Events during fertilization, Molecular and biochemical events during sperm function
	II	***Post fertilization events*** Post fertilization events: early embryonic development

	III	***Sex hormones and Implantation*** Molecular mechanism of sex hormone action and regulation of gene expression. Implantation
	IV	***Infertility and reproductive vaccines*** Infertility and reproductive vaccines. Frontiers in contraceptive research.