

S.No.	Section/Unit	Date of Test
A.	General Biology (Section)	
i)	Biochemistry	4 June
1	Biomolecules structure and function	
2.	Membrane, action potential, transport	
3.	Enzyme, kinetics	
4.	Metabolism	
5.	Photosynthesis, respiration, electron transport chain	
	Revision test 1	10 June
ii)	Microbiology	17 June
6.	Viruses, microbial classification, diversity	
7.	Methods in microbiology	
8.	Respiration, nitrogen fixation	
9.	Host pathogen interaction, disease causing microorganisms, antibiotics mode of action	
	Revision Test 2	20 June
iii)	Immunology	1 July
10.	History, Innate, humoral, cell mediated, organs and cells of immunity	
11.	Ag, Ab structure, function, antibody diversity generation, secretion	
12.	MHC, Autoimmunity, Graft rejection biology, Hypersensitivity reactions	
13.	Monoclonal, polyclonal Ab generation, ELISA, RIA	
	Revision Test 3	5 July
B.	Genetics, Cellular and Molecular Biology (Section)	
iv)	Genetics and Evolutionary Biology:	9 July
14.	Mendelian inheritance, Complementation	
15.	Linkage, recombination, chromosome mapping, extrachromosomal inheritance	
16.	Microbial genetics, transposons	
17.	Genetic disorders, inheritance	
18.	Population genetics [Epigenetics; Selection and inheritance; Adaptive and neutral evolution; Genetic drift; Species and speciation.]	
	Revision Test 4	12 July
v)	Cell Biology	15 July
19.	Cell structure, prokaryotic, eukaryotic	
20.	Cell cycle, mitosis, meiosis, cell growth, control	

21.	Cell signalling and signal transduction	
22.	Cell death and autophagy; Extra-cellular matrix.	
	Revision Test 5	17 July
vi)	Molecular biology and genetics	22 July
23.	Structure of genes, chromosomes, mutation, mutagenesis	
24.	Replication, transcription, translation (prokaryotic and eukaryotic) [Regulation mechanism, non-coding RNA, operons and operon mutants]	
25.	DNA damage and repair	
	Revision Test 6	30 July
C.	Fundamentals of Biological Engineering (Section)	
vii)	Engineering principles applied to biological systems:	6 August
26.	Material and energy balances [for reactive and non-reactive systems; Recycle, bypass and purge processes]	
27.	Stoichiometry of growth and product formation [Degree of reduction, electron balance, theoretical oxygen demand]	
viii)	Classical thermodynamics and Bioenergetics:	13 August
28.	Thermodynamics and Ligand binding [Laws of thermodynamics; Solution thermodynamics; Phase equilibria, reaction equilibria]	
29.	Bioenergetics [Membrane potential; Energetics of metabolic pathways, oxidation and reduction reactions]	
ix)	Transport Processes:	22 August
30.	Fluid flow, Mixing in Bioreactors [Newtonian and non-Newtonian fluids, fluid flow - laminar and turbulent, mixing time]	
31.	Molecular diffusion and film theory [Oxygen transfer and uptake in bioreactor, $k_L a$ and its measurement]	
32.	Heat Transfer [Conductive and convective heat transfer, LMTD, overall heat transfer coefficient; Heat exchangers]	
	Revision Test 7	27 August
D.	Bioprocess Engineering and Process Biotechnology (Section)	
x)	Bioreaction engineering:	10 September

33.	Rate law, Ideal reactors and enzyme immobilization [zero and first order kinetics; Ideal reactors - batch, mixed flow and plug flow; Enzyme immobilization, diffusion effects - Thiele modulus, effectiveness factor, Damkoehler number]	
34.	Cell growth kinetics [Kinetics of cell growth, substrate utilization and product formation; Structured and unstructured models]	
35.	Processes and scale up [Batch, fed-batch and continuous processes; Microbial and enzyme reactors; Optimization and scale up]	
xi)	Upstream and Downstream Processing:	23 September
36.	Upstream processing [Media formulation and optimization; Sterilization of air and media; Filtration - membrane filtration, ultrafiltration; Centrifugation - high speed and ultra; Cell disruption]	
37.	Downstream processing [Principles of chromatography - ion exchange, gel filtration, hydrophobic interaction, affinity, GC, HPLC and FPLC; Extraction, adsorption and drying]	
xii)	Instrumentation and Process Control:	7 October
38.	Instrumentation [Pressure, temperature and flow measurement devices; Valves; First order and second order systems]	
39.	Process control [Feedback and feed forward control; Types of controllers - proportional, derivative and integral control, tuning of controllers]	
	Revision Test 8	12 October
E.	Plant, Animal and Microbial Biotechnology (Section)	
xiii)	Plants:	20 October
40.	Regeneration, tissue culture and kinetics of growth [Totipotency; Regeneration of plants; Plant growth regulators and elicitors; Tissue culture and cell suspension culture system - methodology, kinetics of growth and nutrient optimization]	
41.	Plant secondary metabolites, artificial seeds and protoplast fusion [Production, Hairy root culture; Plant products of industrial importance; Artificial seeds; Somaclonal variation; Protoplast, protoplast fusion - somatic hybrid and cybrid]	
42.	Transgenic plants [direct and indirect methods of gene transfer techniques; Selection marker and reporter gene; Plastid transformation]	
xiv)	Animals:	29 October
43.	Animal cell culture	

	[Culture media composition and growth conditions; Animal cell and tissue preservation; Anchorage and non-anchorage dependent cell culture; Kinetics of cell growth]	
44.	Micro & macro carrier culture, hybridoma and stem cell technology [Animal cloning; Transgenic animals; Knock-out and knock-in animals]	
xv)	Microbes:	6 November
45.	Food and Industrial microbiology [Production of biomass and primary/secondary metabolites - Biofuels, bioplastics, industrial enzymes, antibiotics; Large scale production and purification of recombinant proteins and metabolites; Clinical, Screening strategies for new products]	
	Revision Test 9	10 November
F.	Recombinant DNA technology and Other Tools in Biotechnology (Section)	
xvi)	Recombinant DNA technology:	13 November
46.	Enzymes and vectors [Restriction and modification enzymes; Vectors - plasmids, bacteriophage and other viral vectors, cosmids, Ti plasmid, bacterial and yeast artificial chromosomes; Expression vectors]	
47.	DNA library, expression, transposons and gene targeting [cDNA and genomic DNA library; Gene isolation and cloning, strategies for production of recombinant proteins]	
xvii)	Molecular tools:	20 November
48.	PCR, NA sequencing and blotting [DNA/RNA labelling and sequencing; Southern and northern blotting; In-situ hybridization]	
49.	DNA fingerprinting, CRISPR-Cas and biosensors [RAPD, RFLP; Site-directed mutagenesis; Gene transfer technologies]	
xviii)	Analytical tools:	26 November
50.	Microscopy and spectroscopy [light, electron, fluorescent and confocal microscopy; UV, visible, CD, IR, fluorescence, FT-IR, MS, NMR spectroscopy]	
51.	Electrophoresis, Immunoassays and flow cytometry [Micro-arrays; Enzymatic assays, ELISA, RIA, immunohistochemistry; immunoblotting, Whole genome and CHIP sequencing]	
xix)	Computational tools:	10 December
52.	Search tools, sequence and structure databases [Sequence analysis - sequence file formats, scoring matrices, alignment, phylogeny]	
53.	Genomics, proteomics and metabolomics	

	[Gene prediction; Functional annotation; Secondary structure and 3D structure prediction; Knowledge discovery in biochemical databases; Metagenomics; Metabolic engineering and systems biology]	
	Revision Test 10	12 December
G.	Engineering Mathematics & GA	23 December
	Revision Test 11	30 December
	MOCK TEST 1	6 January
	Revision Test 12	8 January
	MOCK TEST2	13 January
	Revision Test 13	15 January
	MOCK TEST 3	20 January
	Revision Test 14	22 January
	MOCK TEST 4	27 January
	Revision Test 15	29 January
	MOCK TEST 5	1 February