Hindustan College of Science and Technology

Department of Bio-Technology

COURSE OUTCOMES
(SESSION 2021-22)

B.TECH (BIOTECHNOLOGY)

SEMESTER- III

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KOE031-38/ KAS304	Engineering Science Course/Maths V	3	1	0	30	20	50		100		150	4
2	KAS301/ KVE 301	Technical Communication/Universal Human values	2 3	1 0	0 0	30	20	50		100		150	3
3	KBT301	Techniques in Biotechnology	3	1	0	30	20	50		100		150	4
4	KBT302	Microbiology & Immunology	3	1	0	30	20	50		100		150	4
5	KBT303	Biochemistry	3	0	0	30	20	50		100		150	3
6	KBT351	Techniques in Biotechnology Lab	0	0	2				25		25	50	1
7	KBT352	Microbiology & Immunology Lab	0	0	2				25		25	50	1
8	KBT353	Biochemistry Lab	0	0	2				25		25	50	1
9	KBT354	Mini Project or Internship Assessment*	0	0	2			50				50	1
10	KNC301/ KNC302	Computer System Security/Python Programming	2	0	0	15	10	25		50			0
11		MOOCs (Essential for Hons. Degree)											
		Total										**950**	**22**

*The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.

SEMESTER- IV												
Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KAS404/ KOE041-48	Maths V/Engineering Science Course	3	1	0	30	20	50		100		150	4
2	KVE401/ KAS401	Universal Human Values/ Technical Communication	3 2	0 1	0 0	30	20	50		100		150	3
3	KBT401	Bioprocess Engineering I	3	0	0	30	20	50		100		150	3
4	KBT402	Genetics & Molecular Biology	3	1	0	30	20	50		100		150	4
5	KBT403	Enzyme Engineering	3	1	0	30	20	50		100		150	4
6	KBT451	Bioprocess Engineering I Lab	0	0	2				25		25	50	1
7	KBT452	Genetics & Molecular Biology Lab	0	0	2				25		25	50	1
8	KBT453	Enzyme Engineering Lab	0	0	2				25		25	50	1
9	KNC402/ KNC401	Python Programming/Computer System Security	2	0	0	15	10	25		50			0
10		MOOCs (Essential for Hons. Degree)											
		Total										**900**	**21**

RAJEEV KUMAR UPADHYAY

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DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW
B.TECH III YEAR V SEMESTER BIOTECHNOLOGY

SEMESTER- V												SESSION2020-21
Sl. No	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KBT 501	**Genetic Engineering**	3	1	0	30	20	50		100		150	4
2	KBT 502	**Fermentation Biotechnology**	3	1	0	30	20	50		100		150	4
3	KBT 503	**Bioinformatics I**	3	1	0	30	20	50		100		150	4
4	KBT 051-054	Departmental Elective-I	3	0	0	30	20	50		100		150	3
5	KBT 055-058	Departmental Elective-II	3	0	0	30	20	50		100		150	3
6	KBT 551	**Genetic Engineering lab**	0	0	2				25		25	50	1
7	KBT 552	Fermentation Technology Lab	0	0	2				25		25	50	1
8	KBT 553	**Bioinformatics- I virtual lab**	0	0	2				25		25	50	1
9		Mini Project or Internship Assessment*	0	0	2				50			50	1
10	KNC501/ KNC502	Constitution of India, Law and Engineering / Indian Tradition, Culture and Society	2	0	0	15	10	25		50			
11		MOOCs (Essential for Hons. Degree)											
		Total	**17**	**3**	**8**							**950**	**22**

*The Mini Project or internship (4 weeks) conducted during summer break after IV semester and will be assessed during V semester.

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW
B.TECH III YEAR VI SEMESTER BIOTECHNOLOGY

SEMESTER-VI												SESSION2020-21	
Sl. No	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KBT-601	Bioprocess Engineering -II	3	1	0	30	20	50		100		150	4
2	KBT-602	Plant Biotechnology	3	1	0	30	20	50		100		150	4
3	KBT-603	Bioinformatics -II	3	1	0	30	20	50		100		150	4
4	KBT-061 To 064	Departmental Elective-III	3	0	0	30	20	50		100		150	3
5		Open Elective-I	3	0	0	30	20	50		100		150	3
6	KBT-651	Bioprocess Engineering –II Lab	0	0	2				25		25	50	1
7	KBT-652	Plant Biotechnology Lab	0	0	2				25		25	50	1
8	KBT-653	Bioinformatics-II Lab	0	0	2				25		25	50	1
9	KNC601/ KNC602	Constitution of India, Law and Engineering / Indian Tradition, Culture and Society	2	0	0	15	10	25		50			
10		MOOCs (Essential for Hons. Degree)											
		Total	0	3	6							900	21

SEMESTER- VII													
Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KHU701/ KHU702	HSMC -1 #/ HSMC-2 #	3	0	0	30	20	50		100		150	3
2	KBT-071-074	Departmental Elective-IV	3	0	0	30	20	50		100		150	3
3	KBT-075-078	Departmental Elective-V	3	0	0	30	20	50		100		150	3
4		Open Elective-II	3	0	0	30	20	50		100		150	3
5	KBT751X	LAB-1	0	0	2				25		25	50	1
6	KBT752	Mini Project or Internship Assessment*	0	0	2				50			50	1
7	KBT753	Project I	0	0	8				150			150	4
8		MOOCs (Essential for Hons. Degree)											
		Total	12	0	12							850	18

*The Mini Project or internship (4 - 6 weeks) conducted during summer break after VI semester and will be assessed during VIIsemester.

SEMESTER- VIII													
Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KHU801/ KHU802	HSMC-2#/HSMC-1#	3	0	0	30	20	50		100		150	3
2		Open Elective-III	3	0	0	30	20	50		100		150	3
3		Open Elective-IV	3	0	0	30	20	50		100		150	3
4	KBT851	Project II	0	0	18				100		300	400	9
5		MOOCs (Essential for Hons. Degree)	9	0	18								
		Total										850	18

Program Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

1. Graduate shall have the ability to apply fundamental knowledge of mathematics, biology, biological processes, and the scientific method to solve complex problems in biotechnology.
2. Graduate shall have the ability to integrate ethical considerations and perspectives with biological knowledge to effectively analyze and address challenges in biotechnology.

Department: Bio-Technology

Course Outcomes(COs):B.Tech.2nd , 3rd and 4th year

Session:2021-22

B.Tech: 3rd Semester

Energy Science & Engineering	**KOE-033**	CO1:The basics of various forms of energy and its inter-conversion with the help of engines/systems based on thermodynamic cycle and others.
		CO2:To recognize and recall the basics of nuclear reactor terminology, definitions, and concepts associated with reactor physics and theory and technology of nuclear power plant.
		CO3:To explain the principles that underlies the ability of various natural phenomena to deliver solar energy. Outline the technologies that are used to harness the power of solar energy.
		CO4:To understand processing and limitations of fossil fuels (coal, petroleum and natural gas) and identify and explain necessasity of harnessing alternate energy resources.
		CO5:Students may realize the environmental problems directly related to energy production and consumption includes environmental pollution, monitoring and life cycle assessment.
Technical Communication	**KAS-301**	CO1:Students will be enabled to understand the nature and objective of Technical Communication relevant for the work place as Engineers.
		CO2:Students will be enabled to understand the nature and objective of Technical Communication relevant for the work place as Engineers.
		CO3:Students would imbibe inputs by presentation skills to enhance confidence in face of diverse audience.
		CO4:Technical communication skills will create a vast know-how of the application of the learning to promote their technical competence
		CO5:It would enable them to evaluate their efficacy as fluent & efficient communicators by learning the voice-dynamics.
Techniques in Biotechnology	**KBT-301**	CO1:Analyze the basic concepts and fundamentals of microscopy and types of microscopes essential for the emerging fields in research.
		CO2:Demonstrate various chromatography techniques used in the research field for the purpose of diagnosis, separation of interested protein from the mixer etc..
		CO3:Understand fundamentals of electromagnetic radiation, spectrum and spectroscope, NMR,ESR, PET that are essential for various diagnosis purposes.
		CO4:Practice various techniques such as agarose gel electrophoresis, SDS-PAGE, isoelectric focusing, centrifugal force required for the diagnosis purpose in research field.
		CO5:Understand complex principles of 3D printing & Bio-printing, culturing, preparation concept and usage of biopaper, hydrogels and the application of nanobots.

Microbiology & Immunology	**KBT-302**	CO1:Demonstrate morphology & structure of bacterial cell & isolate, identify, culture, preserve and enumerate microbes.
		CO2:Learn the basic features of transduction, conjugation, transformation along with virus structure, classification and reproduction and understand biological nitrogen fixation, bacterial photosynthesis and electron transport system.
		CO3:Identify the major cellular and tissue components of innate and adaptive immune system along with properties of antigens and antibodies and develop a basic understanding of fundamental immunological processes.
		CO4:Interpret the responses of antibody-antigen based interactions and understand regulation of MHC based activation of complement system using cytokines as activators.
		CO5:Develop the understanding of mechanism of bacterial, viral and protozoan diseases, their symptoms and treatment procedures along with microbiology of domestic and waste water and microbes in bioremediation.
Biochemistry	**KBT-303**	CO1:The student should be able to relate the importance of water in biological system and to describe the role of biological buffer.
		CO2:The student should be able to describe structure & function of major biomolecules found in cells, that make them indispensable for life.
		CO3:The student should be able to explain energy generation through carbohydrate metabolism and related diseases.
		CO4:The student should be able to describe energy generation through lipid metabolism and related diseases.
		CO5:The student should be able to explain the metabolic pathways of amin-oacids and proteins and related diseases, role of nucleic acids in various metabolic activities and disorders.
Techniques in Biotechnology Lab	**KBT-351**	CO1:Handle the microscope easily and can discriminate among the features and structure of microorganism
		CO2:Understand basic functions and principle of spectrophotometer about the absorption of wavelength.
		CO3:Understand the basic principle of PC, its uses, importance, and ultimately can differentiate among the different amino acids.
		CO4:Understand and demonstrate the basic principle of TLC, its uses, importance, and ultimately can differentiate among the different amino acids.
		CO5:Visualize the DNA Bands after running it on to the agarose gel and can analyse these bands with the help of ladder.
		CO6:Separation of the mixer of polar and non-polar compound using column chromatography to see different bands of all the compounds present in a sample.
		CO7:Distinguish among the two layers of different compounds
Microbiology & Immunology Lab	**KBT-352**	CO1:Students should be able to apply the principle and application of the equipment and tools used in microbiology laboratory.
		CO2:Students should be able to perform various pure culture techniques used for the isolation and purification of microorganisms.
		CO3:Students should be able to perform the simple and differential staining for the microscopic identification of microorganism.
		CO4:Students should be able to identify the type of blood group using the standard kit method.
		CO5:Students will be able to apply the principles and perform the procedure of immune-diffusion.
		CO6:Students should be able to measure the concentration of antigen or antibody in serum sample by using immunological assays.
Biochemistry Lab	**KBT-353**	CO1:The student should be able to perform quantitative and qualitative analysis of bio-molecules.
		CO2:The student should be able to do the calculations associated with practical work like dilutions, unit conversions and solutions of different concentrations.
		CO3:The student should be able to perform the separation of solutes using chromatographic techniques.
		CO4:The student should be able to perform molecular analysis of DNA using agar[illegible]ctrophoresis.
		CO5:The student should be able to design, execute and analyse a bioche[illegible]d make its report.

MATHS-IV	**KAS-404**	CO1:The idea of Fourier Transforms, Z- Transform and application to solve numerical problems.
		CO2:The concept of probability distribution and their application.
		CO3: The concepts of numerical techniques.
		CO4:The concept of hypothesis and ANOVA, t â€“ test, and Ï‡2 – test.
		CO5:The idea of design ,statistical quality control and control charts
Universal Human Value	**KVE-401**	CO1:The student should be able to understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society and meaning of natural acceptance.
		CO2:The student should be able to Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.
		CO3:Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society in family and society.
		CO4:Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature. harmony in nature and existence.
		CO5:Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work, harmony of professional ethics.
Bioprocess Engineering-I	**KBT-401**	CO1:The student should be able to calculate the rate of heat transfer in conduction, convection and radiation through different surfaces
		CO2:The student should be able to design and analyze the performance of heat exchangers and evaporators.
		CO3:The student should be able to identify and analyse the mechanism of diffusional mass transfer.
		CO4:The student should be able to understand the basic fluid properties, flow forces, and flow regime
		CO5:The student should be able to understand the basic concepts of manometer, venture-meter, orifice meter
Genetics and Molecular Biology	**KBT-402**	CO1:The student should be able to discuss the basics of heredity and variation.
		CO2:The student should be able to illustrate the organization of genome.
		CO3:The student should be able to describe the linkage, recombination and two-point and three-point test crosses.
		CO4:The student should be able to analyze the mechanism of DNA replication, transcription and translation processes taking place in eukaryotes and prokaryotes.
		CO5:The student should be able to distinguish the various checkpoints in cell cycle which prevent cancer and understand its regulation along with apoptosis.
Enzyme Engineering	**KBT-403**	CO1:The student should be able to describe structure, function, activity and kinetics of enzymes.
		CO2:The student should be able to describe the various factors and modes of enzyme inhibition and regulation and incorporate them in industrial applications.
		CO3:The student should be able to summarize processes involved in extraction and purification of enzymes and develop enzyme assays for research and industry.
		CO4:The student should be able to describe and apply enzymes immobilization techniques.
		CO5:The student should be able to discuss and assemble biosensors important to industries, healthcare and environment, design different types of bioreactors using immobilized enzymes.
Bioprocess Engineering-I (Lab)	**KBT-451**	CO1:The student should be able to perform an experiment to calculate the thermal conductivity metal rod.
		CO2:The student should be able to perform an experiment of heat exchangers to understand the concept of heat transfer.
		CO3:The student should be able to perform an experiment dealing thermal conductivity of insulating powder.
		CO4:The student should be able to perform an experiment using venturimeter and manometer to understand the pressure drop concept in pipes.
		CO5:The student should be able to understand an experimental approach for surface tension of fluids.

Genetics and Molecular Biology Lab	**KBT-452**	CO1:The student should be able to understand basic genetics principles and real life implementation
		CO2:The student should be able to comprehend DNA and its components
		CO3:The student should be able to correlate with genomic composition in an organism
		CO4:The student should be able to understand isolation of DNA and its visualization
		CO5:The student should be able to perform and manage DNA experiments
Enzyme Engineering Lab	**KBT-453**	CO1:The student should be able to extract enzyme from plant and microbial source.
		CO2:The student should be able to perform partial purification methods and quantification of enzyme.
		CO3:The student should be able to demonstrate effect of temperature on enzyme activity.
		CO4:The student should be able to demonstrate effect of pH and time on enzyme activity.
		CO5:The student should be able to demonstrate effect of substrate and enzyme concentration on enzyme activity, methods of immobilization of enzymes.
Genetic Engineering	**KBT-501**	CO1:Students will be able to appraise proper use of host and vector for gene cloning
		CO2:Students will be able to identification of appropriate method for DNA delivery into the host
		CO3:Students will be able to use of gene library for screening of desired sequence/protein
		CO4:Students will be able to cloning process of whole organism and applications
		CO5:Students will be able to process of recombinant protein expression, cell signalling and ethical issues related to gene transfer
Fermentation Biotechnology	**KBT-502**	CO1:Student will be able to understand the concepts and process technologies of fermentation.
		CO2:Student will be able to learn the application and use of different raw materials and its use in industrial scale production.
		CO3:Student will be able to understand the regulatory system in the microorganism.
		CO4:Student will be able to learn the strain improvement technologies and its role in Fermentation.
		CO5:Student will be able to learn the concepts of the scale up and scale down criteria of fermentation process and production of metabolites.
Bioinformatics-1	**KBT-503**	CO1:Understand concepts and application of Bioinformatics, types of databases, sequence similarity, sequence patterns and profiles
		CO2:Use sequence alignment techniques, database searching, pairwise and multiple sequence alignment using various tools.
		CO3:Practice scoring matrices and its types including PAM , BLOSUM series and matrices for nucleic acid and protein sequences.
		CO4:Apply phylogeny and its concepts in molecular evolution and different methods of Phylogenetic tree construction
		CO5: Understand and apply the protein structure prediction and application of bioinformatics in drug designing.
Pharmaceutical Biotechnology	**KBT051**	CO1:Students will be able to understand concepts and application of pharmaceutical industry,Therapeutic agents, biopharmaceuticals.
		CO2:Students will be able to understand the process off drug manufacturing, processing, preservation, analytical methods and quality management.
		CO3:Students will be able to apply the knowledge of new drug development, GMP and Economics of drug development in pharma industry
		CO4:Students will be able to use knowledge of Drug regulation and control. Scope and applications of biotechnology in pharmacy.
		CO5:Students will be able to the business and the future of Biopharmaceuticals.
Bio-fuels & Alcohol Technology	**KBT055**	CO1:Student will be able to explain the basic concepts of metabolism and importance of metabolic engineering.
		CO2:Student will be able to understand the production of metabolites and its regulation.
		CO3:Student will be able to explain the applications, specificity and product inhibition.
		CO4:Student will be able to understand the concept of regulation of enzyme activity, strain improvement.

Constitution of India	**KNC501**	CO1:Students will be able to learn & understand the nature and objective of Indian Constitution law & engineering.
		CO2:Students will be able to understand legacies of constitutional development in India and help those to understand the most diversified legal document of India and philosophy behind it.
		CO3:Students would imbibe inputs regarding the role various constitutional & democratic institutions in keeping society free & understand the role of citizens in various electoral systems, solve problems related to various legal aspects.
		CO4:Students will be able to develop the new business based on ownership and solve problem using latest tools.
		CO5:Students will be able to develop solutions and apply constitutional aspects for social harmony & national Integrity.
Genetic Engineering Lab	**KBT-551**	CO1:Demonstrate the isolation of genetic material
		CO2:Perform experiments relating to cloning, ligation, restriction digestion and transformation, etc
		CO3:Demonstrate the southern blotting for identification of desired DNA in a pool DNA sample
		CO4:Perform the bacterial cell competent for transformation
Fermentation Biotechnology Lab	**KBT-552**	CO1:Student will be able to perform the growth pattern of E.coli
		CO2:Student will be able to perform experiments related to production of antibiotics, enzymes and acids through fermentation process
		CO3:Student will be able to demonstrate the downstream processing of fermentative products.
		CO4:Student will be able to perform the solid state fermentation and submerged fermentation
Bioinformatics-1Virtual Lab	**KBT-553**	CO1:Demonstrate the retrieval of sequence data.
		CO2:Perform experiments related to locating chromosome and gene expression data.
		CO3:Demonstrate the data retrieval system of PubMed.
		CO4:Perform the ORF finding and retrieval of gene information.
		CO5:To understand the phylogenetic among various species.
		CO6:Demonstration of BLAST and FASTA
		CO7:To understand the homologous relationship among the distantly related species.
Bioprocess Engineering-II	**KBT-601**	CO1:Understand the kinetics of microbial growth and the associated parameters.
		CO2:Utilize sterilization concepts necessary for proper bioreactor operation.
		CO3:Discuss the basics of ideal reactor operation.
		CO4:Explain the concept and mechanism of mass transfer in bioprocessing.
		CO5:Analyze the concept of bioreactor control mechanism and identify suitable control system.
Plant Biotechnology	**KBT-602**	CO1:Student will be able to understand the principle and basic requirements for plant tissue culture.
		CO2:Students will be able to explain the difference between tissue and organ culture and their applicability.
		CO3:Students will be able to understand haploid culture and in vitro selection of mutants..
		CO4:Student will be able to analyze somaclonal variation for improved crop varieties in-vitro cultures.
		CO5:Student will be able to identify suitable cryopreservation and re-culture technique for the cultured tissue, development of transgenic plants through genetic manipulations.
Bioinformatics-II	**KBT-603**	CO1:Understand inference problems and techniques for molecular biology.
		CO2:Demonstration of RNA structure prediction and modeling.
		CO3:Identify with various aspects of machine learning like different algorithms and relation of ML with stats, etc.
		CO4:Know the basic concept of simulation and force field.
		CO5:Express NLP with its parsing, data collection and in-silico drug design.

Food Biotechnology	**KBT-063**	CO1:To introduce significance of microbes in food & food industry and to learn the basic principles of the equipment involved in unit operations.
		Co2:Basic knowledge and techniques about starter culturing, probiotics, fermented food production, SCP, etc.
		CO3:To determine microbial examination, enumeration and detection of food borne organisms, nutritional boost and flavor enhancers, metabolic injured organisms and Emerging processing and preservation technologies for milk and dairy products.
		CO4:To learn different techniques of food preservation.
		CO5:To impart knowledge about indicators of food safety and HACCP system.
IDEA TO BUSINESS MODEL	**KOE-060**	CO1:The student should be able to enhance creative knowledge of students regarding selection of a business idea and it's implementation process.
		CO2:The student should be able to acquire knowledge on entrepreneurship development, its Pro's and con's.
		CO3:The student should be able to acquire basic knowledge on how to become an Entrepreneur.
		CO4:The student should be able to develop knowledge on Production systems and it's sustainability through production, planning and control (PPC)
		CO5:The student should be able to develop appropriate business model and apply in a better way.
INDIAN TRADITION, CULTURE & SOCIETY	**KNC-602**	CO1:Students will be able to identify and understand the roots and details of Society State and Polity in India.
		CO2:Students will be able to understand the importance of Indian Literature, Culture, Tradition, Practices and to apply in present system
		CO3:Students will be able to analyze the Indian Religion, Philosophy, Practices and in shadow of Pre-Vedic and Vedic Religion, Buddhism,
		CO4:Students will be able to analyze the Science, Management and Indian Knowledge System and to apply in present system.
		CO5:Students will be able to evaluate the Indian Architect, Engineering and Architecture in Ancient India, Indian's Cultural Contribution to the World and to create environment in Arts and
Bioprocess Engineering-II Lab	**KBT-651**	CO1:Analyze the data on growth kinetics of *E.coli.*
		CO2:Discuss the upstream and down- stream bio-processing for citric acid and α-amylase production.
		CO3:Analyze the thermal death kinetics.
		CO4:Perform immobilization of enzymes and cells.
		CO5:Develop computational design for fermentative production of L-lysine
Plant Biotechnology Lab	**KBT-652**	CO1:The student should be able to operate and handle the plant biotechnology lab equipments.
		CO2:The student should be able to perform tissue culture media preparation, sterilization and explants selection.
		CO3:The student should be able to understand in vitro cultures through axillary bud induction
		CO4:The student should be able to analyze plant secondary metabolites from selected medicinal plants.
Bioinformatics-II Lab	**KBT-653**	CO1:Understand the basics of software and tools used in structure prediction of biomolecules.
		CO2:Conduct experimental procedure for Ramachandran plot and its analysis.
		CO3:Construct and analyze of restriction maps, QSAR model and homology model.
		CO4:Identify and structurally modify a natural product, to design a compound with the desired properties and to assess its therapeutic effects, theoretically.
		CO5;Enhance their practical knowledge and thus their employability.

Environmental Biotechnology	**KBT-701**	CO1:The student should be able to grasp the concepts of environmental pollution, Types of pollution, causes, effects, measurement and control of pollution.
		CO2:The student should be able to analyze the role of biotechnology for waste treatment, concept and mechanism of waste to biofuels production.
		CO3:The student should be able to understand the designing and working mechanism of different reactors used for waste water treatment.
		CO4:The student should be able to learn about the Processes and technology for waste utilization and conversion in to value added products
		CO5:The student should be able to grasp the concepts of environmental impact assessment, sustainable development, different act and laws for environment protection.
Biosafety, Bioethics and IPR	**KBT-075**	CO1:Get an adequate knowledge on biosafety-regulatory framework for GMO's in India
		CO2:Understand biosafety-regulatory framework for GMOS at international level
		CO3:Identify the role bioethics in IPR
		CO4:Disseminate knowledge on different tools of IPR o make students aware about current trends in IPR and Govt. supports in promoting IPR
		CO5:Identify the role of Patent and Patent law
Project Management and Entrepreneurship	**KHU-702**	CO1:The students should be able to introduce various qualities required for entrepreneurship.
		CO2:The students should be able to think creative and innovative, business Opportunities, value creation.
		CO3:The students should be able to write and understand Project management, "Project Life Cycle, Project managerial skill
		CO4:The students should be able to write project proposal, Project financing, Project Balance sheet
		CO5:The students should be able to social Entrepreneurship, Social Innovators, Social venture
Value Relationship & Ethical Human Conduct for Happy and Harmonious Society	**KOE076**	CO1:To help the students to understand the importance and types of relationship with expressions
		CO2:To develop the competence to think about the conceptual framework of undivided society as well as universal human order.
		CO3:To help the students to develop the exposure for transition from current state to the undivided society and universal human order.
Environmental Biotechnology Lab	**KBT751**	CO1:The student should be able to describe the working of equipments used in environmental biotechnology lab.
		CO2:The student should be able to perform statistical analysis in the water quality testing.
		CO3:The student should be able to prepare various solutions and chemical reagents.
		CO4:The student should be able to perform experiment to evaluate various parameters that affect the water quality.
		CO5:The student should be able to apply general chemical techniques to evaluate microbial contamination of water.
		CO6:The student should be able to apply general microbiological techniques to evaluate microbial contaminant in water.
RURAL DEVELOPMENT: ADMINISTRATION & PLANNING	**KHU-801**	CO1:Students will be able to understand the definitions, concepts and components of Rural Development
		CO2:Students will know the importance, structure, significance, resources of Indian rural economy.
		CO3:Students will have a clear idea about the area development programmes and its impact.
		CO4:Students will be able to acquire knowledge about rural entrepreneurship.
		CO5:Students will be able to understand about the using of different methods for resource planning

Quality Management	**KOE-085**	CO1: Know details of quality concept, quality control evaluation
		CO2:Know the insights of quality management
		CO3:Know the details of Control Charts
		CO4:Know the defect diagnosis and prevention
		CO5:Know the detailed standards to maintain quality