

PROGRAMME PROJECT REPORT (PPR)

Name of the Programme: **MASTER OF SCIENCE IN BIOTECHNOLOGY
(M.SC., BIOTECHNOLOGY)**

Duration: Minimum 2 years
 Maximum 4 years

Recognition: This Programme was recognized by the DEC-IGNOU and now by the UGC-DEB

A. PROGRAMME'S MISSION & VISION

Vision:

To provide comprehensive, relevant curriculum and train the Learner/students in the field of Biotechnology. Enabling the Learner to take up careers in academic (teaching and research), Industry and Government sector, along with conducting significant societal based research.

To provide an opportunity to all those who could not be able to take up formal mode education in the field of Biotechnology and train them to enhance their skill and knowledge, and build a human resource in the field of Biotechnology.

Mission:

Through offering this programme to the interested Learners the following mission objectives are intended to

- Explain the understanding of techniques for tissue culture, cell culture and organ transplantation.
- Explain the industrial processes for production of antibiotics, enzymes etc.
- Explain the gene surgery and gene therapy to cure genetic disease to create improved varieties of plants and animals through genetic engineering and plant breeding.
- Encourage scientific research and publications in the accredited scientific publications.
- Encourage participation in scientific forums and seminars.
- Encourage follow up of latest scientific research and techniques in this field.
- Initiate multi-disciplinary programs through academia-industry interface with special emphasis on implementation of bioprocess design and scale-up.

Objectives

- The major objectives of present Programme has been prepared keeping in view of the course requirements for those candidates seeking Post-Graduate Distance Education in Biotechnology.
- Specific purpose of the course is to create awareness to students of Distance Education Council about status of genetic engineering.

- The Biotechnology Department is a community of learners and teacher-scholars, which has as its mission to help all its students gain an appreciation of biotechniques, both as a science and as a humanistic study.
- The Biotechnology department will build a solid foundation of growth, skills and knowledge of technology adapted to the field of Biological sciences, our passion for educating tomorrow's leaders is supported by our desire to provide a seamless education experience.

B. RELEVANCE OF THE PROGRAM WITH HEI'S MISSION AND GOALS

Kuvempu University is an affiliating State University in Karnataka. Established in 1987, it is a University with a distinctive academic profile, blending in itself commitment to rural ethos and a modern spirit. It has 37 Post-Graduate departments of studies in the faculties of Arts, Science, Commerce, Education and Law. It also has 4 constituent colleges at Shankaraghatta and Shivamogga, and two outlying regional Post-Graduate Centres at Kadur and Chikkamagalur.

The Vision and Mission of the University are:

Vision: Kuvempu University shall strive to become an international centre of excellence in teaching and research to provide high quality value based education to all through various modes to meet the global challenges.

Mission:

Foster creativity in teaching, learning and research to build a knowledge base and promote quality initiative.

Provide access to education to all.

Develop human resources to meet the societal needs.

The Distance Education Programmes are a part of the University's outreach programmes for the rural masses and also to foster University-Society relationship with the motto of "**Education for All**", to provide quality education at the doorsteps of desirous individuals who want to take up higher education, for the discontinued who could not take up formal education, housewives and employees who want to improve and enhance their knowledge. The University firmly believes that education and seeking knowledge is a **Lifelong Learning** concept.

Offering higher education through Distance Mode is an important step taken by Kuvempu University so as to help the student community in their zeal to pursue higher education at both UG and PG Level. The University felt the necessity of this when a large number of students, who wanted seats for PG. Studies, could not be accommodated in our regular P.G. Programmes. The University believes that Distance Education Mode is an equally good avenue to be made available to interested students. With these views, Kuvempu University started offering courses through distance mode since 2002-2003. At present it is offering 31 Programmes (earlier called Courses) in various faculties at the U.G., P.G. and PG Diploma levels. These courses were approved by the erstwhile DEC-IGNOU, and now by the UGC-DEB.

Goals & Objectives of Distance Mode Programmes

- Reach out to larger sections of the society who are willing to seeking non-formal education.
- Capacity Building by using the non-formal mode platform.
- Concentrate on planning & constant upgradation of facilities to meet new challenges in education through Distance Mode.
- Provide counseling & consultancy to students.
- Offer area/ region wise educational requirements.
- Skill Development and Enhancement.
- To impart quality training through interactive learning module.
- Interactive Pedagogy of teaching-learning and flexible learning environment.
- Provide supportive academic environment and effective teaching.

C. NATURE OF PROSPECTIVE TARGET GROUP OF LEARNERS:

The target group of this specialized programme is the persons working in academic, research and production wings of various government institutions, biotechnology and its subsidiary labs and industries, who are working after their graduation. It is highlighted that the study of Biotechnology helps provide students with important for its implications in health and medicine. Through genetic engineering – the controlled alteration of genetic material – scientists have been able to create new medicines, including interferon for cancer patients, synthetic human growth hormone and synthetic insulin, among others. In recent years, scientists have also attempted to employ the methods of genetic engineering to correct certain inherited conditions, and have been making great strides in their ability to manipulate genetic materials. These advances suggest the prospect of human control over the very genetic makeup of man, and thus the ability to manipulate our inherited traits.

D. APPROPRIATENESS OF PROGRAMME TO BE CONDUCTED IN OPEN AND DISTANCE LEARNING MODE TO ACQUIRE SPECIFIC SKILLS AND COMPETENCE

Education through Distance Mode has become as an important and widely accepted strategy to counteract the inadequacy of the traditional system of education to keep abreast of the new demands. Distance Education is seen as a means of passing on the benefits of recent advances in communication technology to the masses and thereby actualising the concept of a learned society. Master of Science in Biotechnology Programme provides opportunities for the in-service teachers, analytical chemist assayer, chemical instrument technician, environmental control analysis and lab assistants to understand the latest trends in teaching learning process and advancements in analytical techniques. The existing workforce can take the advantage of DDE Biotechnology Programme to increase their skills and competence in this particular field without disturbing their work schedule. It should also Endeavour to develop in the future practitioners a deep and critical awareness of professional ethics and an ability to critically engage in and reflect on practice.

Further, the Programme develops ability to apply acquired knowledge and solve problems in new or unfamiliar surroundings within broader (or multi-disciplinary) contexts related to the area of study. The Programme will expose students to the diversity and variety of educational practices, policies, settings, and contexts in India. The Programme aims to build among our graduates capabilities for ongoing self motivated professional

development. The Programme will strive to develop capabilities to plan independent educational interventions in various roles such as those of curriculum developers, textbook/ material developers, teacher educators, analytical scientists and researchers. The programme would provide learners a wider and more comprehensive understanding of Biotechnology as field of knowledge and would accommodate a wide variety of learning needs of learners.

E. INSTRUCTIONAL DESIGN:

(i) Programme Formulation:

Proposal from the concerned PG department to commence the programme was placed before Monitoring Committee of the DDE/Syndicate. Then it will be referred to the BOS concerned for formulation and approval of the syllabus scheme pattern, time allotment for each paper, marks allotment, scheme of examination etc., then it was placed in the Faculty meeting and then Academic Council (the highest body) of the University for its approval. After approval by both the bodies, the programme was introduced. The academic advisory body of DDE refers the matter to the concerned subject/parent department council for preparation of study material. The concern subject faculty will coordinate with the DDE and the department council, as he/she is on the member in it. Workshops for preparing study material in SLM mode are regularly conducted (with the help of IGNOU experts).

(ii) **Curriculum design:** The Programme is 2 years duration with annual examinations. The maximum period allowed is 4 years (double the duration). The Programme structure is as below.

Year	Papers	Marks		
		Term End Exams	Continuous Evaluation/IA	Total
First Year	Course 1: Chemistry of Biomolecules and Biostatistics	85	15	100
	Course 2: Cell and Molecular Biology	85	15	100
	Course 3: Microbiology and Immunology	85	15	100
	Course 4: Basic Enzymology	85	15	100
	Practical-1: Based on Course 1 & 2	55	20	75
	Practical-2: Based on Course 3 & 4	55	20	75
	Total marks	450	100	550
Second Year	Course 6: Cell and Tissue culture Technology	85	15	100
	Course 7: Industrial and Environmental Biotechnology	85	15	100
	Course 8: Computer application and Bioinformatics	85	15	100
	Course 9: Recombinant DNA Technology	85	15	100
	Practical-3: Based on Course 5 & 6	55	20	75
	Practical-4: Based on Course 7 & 8	55	20	75
	Total marks	450	100	550
Total Marks - I Year & II Year		900	200	1100

(iii) Medium of Instruction:

The medium of instruction shall be English.

(iv) Detailed syllabi: Given as Appendix-01

(v) Faculty and Supporting Staff Requirement:

Full time faculty in regular department will be involved in orientation counseling, and face to face programmes. Such programmes are scheduled during the vacation time of the regular department, which will meet the faculty availability and infrastructure need of ODL Programme. Coordinator of the programme, who is a regular faculty member and the Research and Teaching Assistant (RTA) will be in-charge of the Programme, who will address the day to day academic and learner/student support aspects of the Programme.

Regarding supporting staff, DDE has a separate and well equipped wing/office to take care of all the administration and delivery aspects of ODL Programmes.

There is a separate DDE wing in the Office of the Registrar (Evaluation) for all the evaluation and certification aspects headed by a Deputy/Assistant Registrar.

The DDE and Evaluation wings are fully computerized and technical staff assist in all the activities.

(vi) Instructional Delivery Mechanism

Instructional delivery mechanism is through study materials prepared by the experts in the subjects concerned. Study materials (SLM) are prepared in-house by the faculty of the department and the faculty from sister universities.

The study material provided is the general guide and covers the course content in order the learner understand core content of the course concerned. Learners are advised to make use of the reference books in the list of books provided along with the syllabus.

Contact Programme: There will be a contact programme for a minimum duration of 15 days normally. A minimum of 15 days for instruction by experienced and scholarly faculty will be arranged for each paper. There shall be interaction built around lectures, discussions, individual and group activities. A test will be conducted for the candidates in each paper at the end of the contact programme.

Student support service: Students can interact with the Office/Faculty through e-mails and personal visits. SMS alert facility for the students regarding dissemination of information relating to conduct of PCPs/Orientation Programme and Production file submission deadlines etc. Student Support Service is provided through online mode and grievance handling mechanism is adopted with the help of supporting technical staff. All necessary and relevant information are uploaded in the dedicated website: www.kuvempuuniversitydde.org. Internal Assignments with Guidelines, previous years question papers, notifications timetables and results are available from the website.

F. PROCEDURE FOR ADMISSIONS, CURRICULUM TRANSACTION AND EVALUATION:

As outlined in Section-B, Kuvempu University has a policy to provide opportunity to maximum number of eligible and desirous candidate from all sections of the Society including a class having of low-level of disposable income, rural dwellers, women unskilled men minorities etc.

(i) Eligibility for the Programme

Any candidate who has passed the three year BSc degree examination with Biotechnology/Botany/Zoology/Life Science as an major/optional or BSc. Agriculture, B.Sc Horticulture or any other degree, from this University or any University having Bioscience as an optional is eligible for admission to the MSc Biotechnology

All the candidates who fulfill eligibility criteria are admitted to the programme. If university decides for maximum number of candidates for Programme, admissions are made first come first basis.

(ii) Admission Process

- Notification issued by the Directorate of Distance Education (DDE) in Regional and National News papers and in the official website.
- Uploading of the Application by the candidate through Online only.
- Payment of fee through online (various options like net banking etc.) or through banks/post offices using printout of the challan.
- Submission of the printout of the application by the candidate to DDE along with original documents for eligibility, date of birth etc., and along with fee paid receipt.
- Verification of applications- for fulfillment of eligibility criteria (marks cards) documents, fee paid details.
- Approval of the admission and issue of self learning material (Study Materials) to the students.

(iii) Fee Structure

Figures in rupees as prescribed for the academic year 2017-18

SN	Fee Component	First Year	Second Year
Admission Orientation and Other Components			
1	Registration	2000	-
2	Admission	3000	3000
3	Orientation/ Tuition fee	3000	3000
4	Practicals	4500	4500
5	Study materials	4700	4700
6	Liaison	100	100
7	IA Books	250	250

8	Postage	250	250
9	UDF (DDE)	100	100
Examination , Certification and Other Components			
10	Examination	2100	2100
11	PPC	-	250
12	Convocation	-	-
TOTAL		20,000	18,250

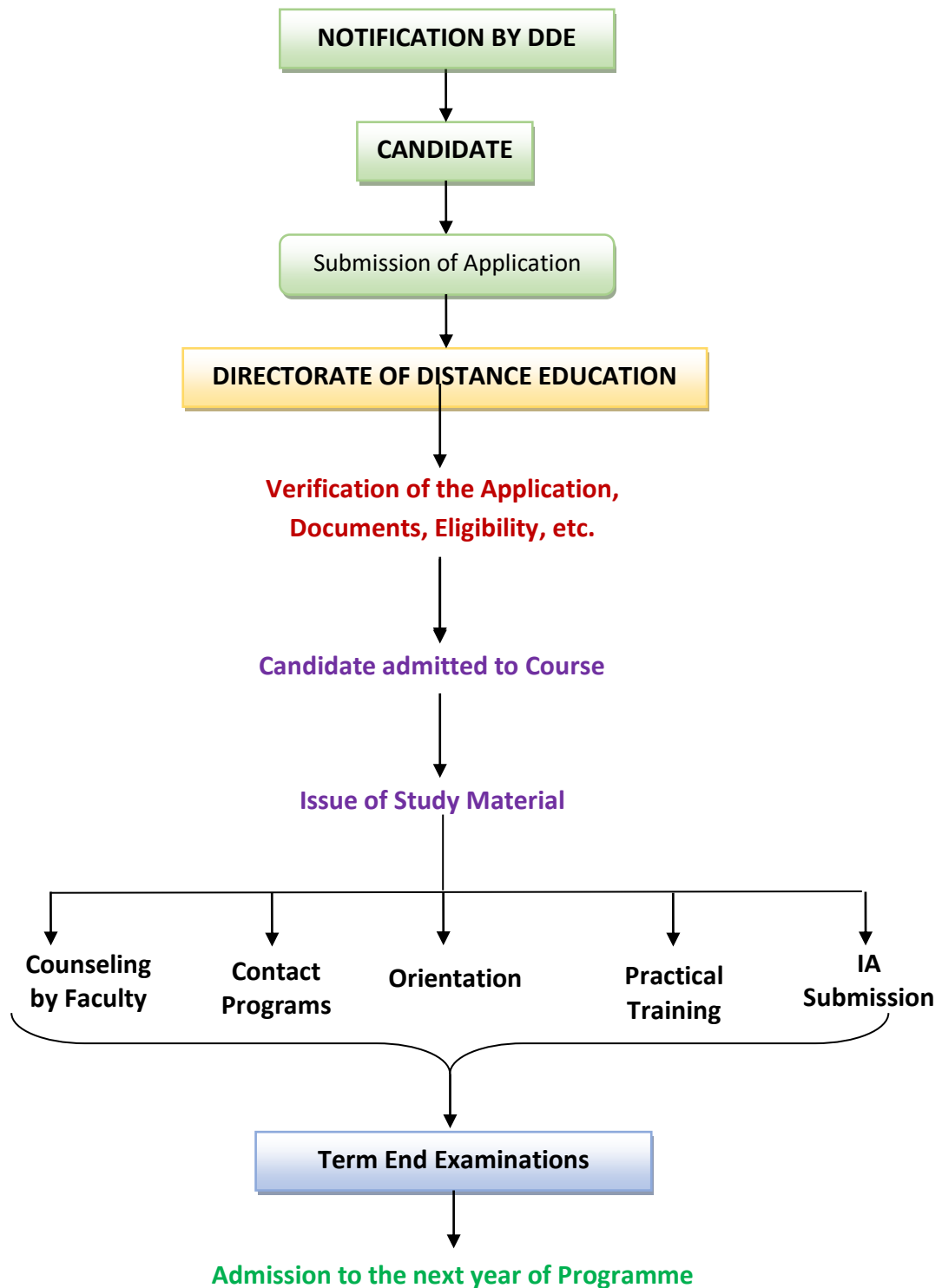
Financial Assistance:

- SC/ST and OBC Students can avail scholarship/fee reimbursement from the concerned State Departments/Agencies
- Fee Concession to Physically Handicap Candidates.
- Fee concession to Employees of the University and their dependents.
- Fee concession to Ex- servicemen.
- Scholarships and education supports extended by various Governmental and Non-Governmental agencies.

(iv) Academic and Activity Planner:

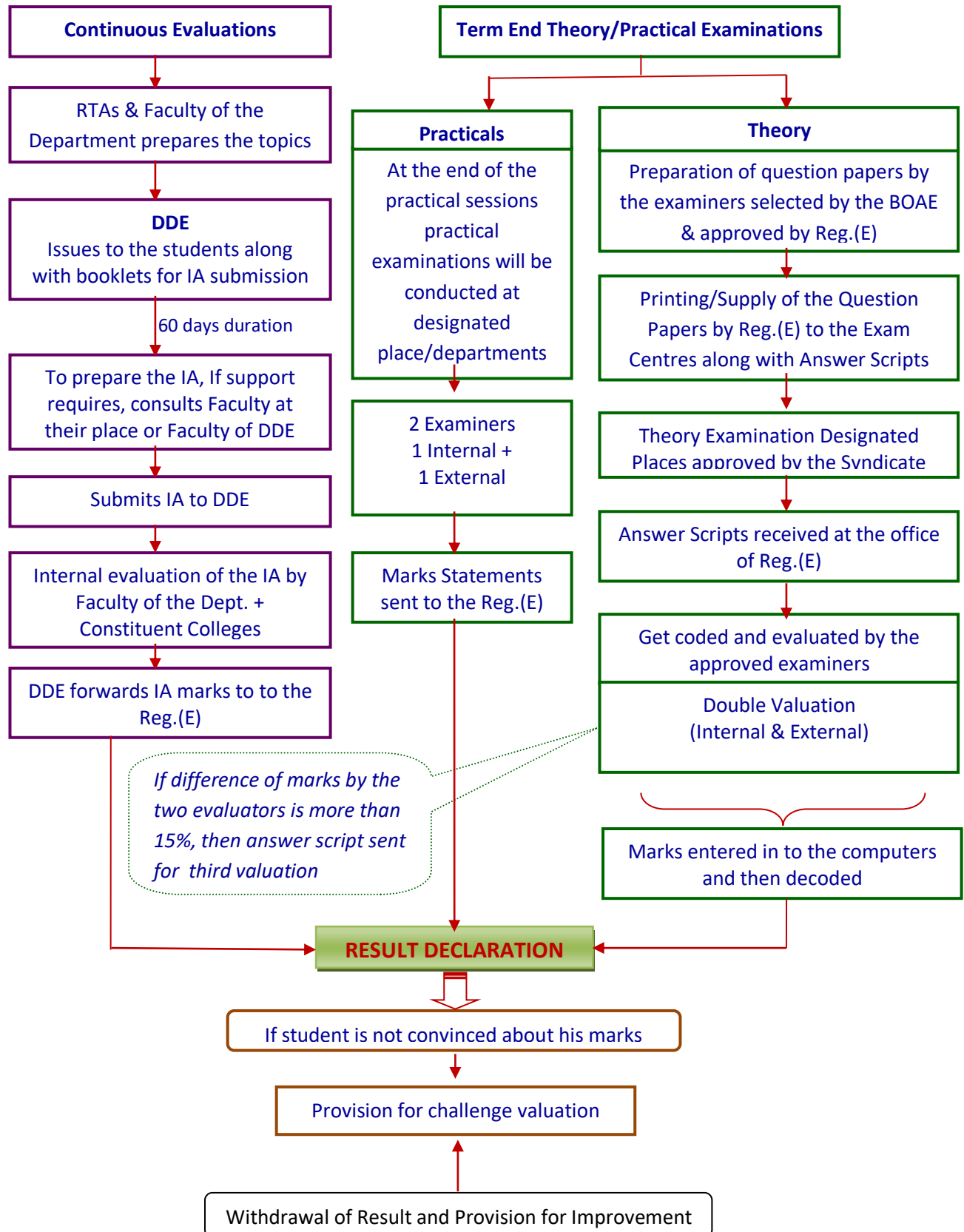
Calendar Year-I		
1	Issue of Notification	July / August
2	Commencement of Online Admissions	July / August
3	Last Date for submission of online applications by the students without Late Fee	October 31
4	Last Date for submission of online applications by the students with late fee	December 31
5	Issue of Study Material and Assignment Books (immediately after verification of the applications)	July to December
Calendar Year-II		
6	Issue of assignment topics Commencement of Counseling sessions	December - January
7	Commencement of Face-to-Face (Orientation) Sessions	February –March
8	Completion of all Orientation Sessions	April 30
9	Last date for Submission of Internal Assignments/ Project Reports	April 30
10	Tentative date for commencement of Examination.	May / June
11	Declaration of Examination Results	August / September

Generalised Academic Flow Chart for the Distance Mode Learners



(v) Evaluation of Learner Progress

Evaluation Process is given here in the form of Flowchart. This Flowchart is common to all Programme at UG, PG and PG Diploma level offered by the University.



Internal Assessments:

- As a part of continuous assessment the candidates will have to complete assignments in the booklets provided by DDE and submit them to the Directorate of Distance Education within the specified date. The Topics & Instructions for I.A. will be notified in the Students Corner section of the website and also issued to the students directly or through Student Counseling Centres.
- It is mandatory to submit the I.A. in the same year of registration. However, if the candidate failed to take up the theory examination, for any reason, such candidate can submit the I.A. in the next year with prior permission from the DDE.
- All students are expected to complete the above assessments before taking the Term end Examination.
- There is no provision for resubmission of I.A.

Provision for class tests and workout exercises: during Counseling and Face-to-Face (Orientation/Contact) programmes.

(i) Term End (written) Examination:

Duration: Duration: 3 hours, **Maximum marks:** 80

Questions pattern - Theory

Time: 3 Hours. Marks: 85
Short answer questions 7 x 3marks each – Total 21marks
Medium answer questions 3 x 8 marks each – Total 24
Long answer questions with multiple choice 2 x15 Marks each – total 30 marks
Long answer questions with multiple choice 1 x10 Marks – total 10 marks

Questions Pattern – Practical

- For M.Sc. Biotechnology Programme, the candidates will have to attend practical sessions for specified days (25 days) at designated University Departments / Colleges
- Programme consists of two practical courses in each year. Each practicals course will be for 75 marks of which 55 for Practical work, 10 mark for viva and 10 marks for Record.
- The practical examination can be repeated if the candidate has failed to take up the practicals and practical examination in the concerned year. If a candidate fails to attend the regular practical course and exam, he/ she may take up the theory exam and take practicals later.

Declaration of class: At the completion of course evaluation (the Programme) the class will be awarded on the basis of the aggregate of marks at both previous and final examinations taken together.

Pass Class	:	40% of marks or above but below 50% of marks.
Second class	:	50% of marks or above but below 60% of marks.
First Class	:	60% of marks or above.

Separate Ranks and Medals are awarded to ODL Learners. Policy for awarding ranks and medals are same as the one followed for the Regular Programme.

Reappearing for Exams: The unsuccessful candidates at the P.G. Examinations of a particular year are required to reappear for those papers/examinations only as per the syllabus of that year. The repeaters are therefore advised to preserve the syllabus and study material until they pass the final year of the course.

Candidates will have to complete all the exams within double the durations of the course (and not the number of attempts). The double the duration is reckoned from the year of registration.

A candidate is permitted to register for the final year examination irrespective of the number of courses failed at the previous theory exams.

(ii) Other Policy/Provisions

Renewal of Registration: Students of II year who have failed to pay the II year programme fee in the respective year are permitted to renew their registration by paying the specified course fee along with registration renewal fee and continue their programme. However they should complete the programme with in the maximum permissible period i.e., 4 years.

Bonafide student certificate: Those candidates who require Bonafide Certificate/ Study Certificate can obtain by submitting a written request or a filled in prescribed application form (available from the KUDDE website) along with a fee of Rs. 100/- paid either through Bank Challan or Demand Draft.

Change of Address: Any change in the address of the students should be intimated to the Directorate with a fee of Rs. 100/- paid through a challan of Electronic Transfer. No change of address will be entertained once the students receive their examination hall ticket. The Directorate of Distance Education is not responsible for missing correspondence due to change of address without getting address changed at DDE.

Name Correction: Change of Name, if any required, candidate has to make a written request along with relevant documents as proof of change of name, and by paying specified fee.

Duplicate Registration Card: For issue of duplicate Admission/Registration/ Enrollment card- Rs. 200/- will be charged.

Transfer Certificate: A Transfer Certificate is not required for admission to any of the KUDDE courses. The Directorate will also not issue Transfer Certificate at the time of completion of the course. However, for Lateral Entry admissions a migration and transfer certificate will be required from such students.

Change of Examination Centre: DDE will not entertain any change of exam centre unless there is a proof of change of address and it is permissible.

Discrepancies in Marks cards and certificates: In case of any discrepancies observed in the marks card/ certificates etc., candidates have to bring it to the notice of the Director, DDE through a written request within a period of 3 months from the date of issue of the document.

Miscellaneous: All the original certificates submitted by the candidates in connection with their admission, registration will be returned to them from the Office of the DDE along with the registration certificate. In case any of their certificates are not received back, they must bring the same to the notice of The Director, DDE, Kuvempu University, immediately. The original records will be maintained for a minimum period of three months. If the candidates ask for the originals before three months, their requests will not be entertained.

Preservation of Answer Scripts / IA Scripts: The answer scripts of Theory Exams will be preserved for a maximum duration of 6 months from the date of announcement of results/ revaluation / challenge valuation results. Any query or request for verifications may be submitted, through a written request, within the notified period only.

Similarly, written IA Scripts of the students will be preserved for a period of six months from the date of announcement of the results (First announcement of results). Any discrepancy observed regarding IA marks may be informed to DDE through a written request within three months from the date of issue of results. Later request may not be accepted.

Students are advised to refer the website for notifications regarding preservation of various documents, issued from time to time.

Notwithstanding any conditions mentioned above the University reserves the right to change, alter, and amend any of the above clauses/conditions. In matters of fees for unforeseen issues / certificates/ endorsements the University may fix the amount subject to the existing fee structure or change it from time to time.

Post-Examination Related Issues: For all matters regarding post-examination Certifications - such as, issue of Convocation (Degree) Certificates, Duplicate Marks Cards, Provisional Pass Certificate (PPC), Name Correction, Consolidated Marks Cards, removal of NCL, Academic Transcript, verification of genuineness of Marks Cards and Certificates, and Processing Certificates - enquiries can be made directly at the Office of Registrar (Evaluation). Candidates are informed to contact, for any related information/clarifications, the Helpdesk at the O/o Registrar (Evaluation) by telephone and e-mail ID given the website.

G. LIBRARY RESOURCES

A well established library facility shall be made available with the support of the university library. In the campus we have modern and well equipped building of library in Kuvempu University offers excellent infrastructure facilities in reading, browsing and reference to the students, teachers and research scholars. The library has kept pace with modernisation by introducing CD ROM data base, internet and e-mail facilities. It is also a nodal centre for INFLIBNET, access is available to 10,000 + e-journals online under the

UGC- infonet Consortia. There is a well developed digital library and campus network interconnecting all the Post-Graduate departments and offices in the campus.

Further, the DDE will made special effort to upgrade the existing DDE Library exclusively for distance learners with an emphasis on distribution of information and course material online by making use of the state-of-art information and communication technologies.

Library Card: Candidates who are desirous to avail themselves the facilities of Kuvempu University Main Library on the campus will be permitted. They have to obtain a separate Library / ID Card on payment of Rs. 100/- (through Challan of Electronic Transfer). However, no books will be issued to them.

H. COST ESTIMATE OF THE PROGRAMME AND THE PROVISIONS

Cost Estimated of the Programme is based on following components

– calculated for an admission of 50 Students:

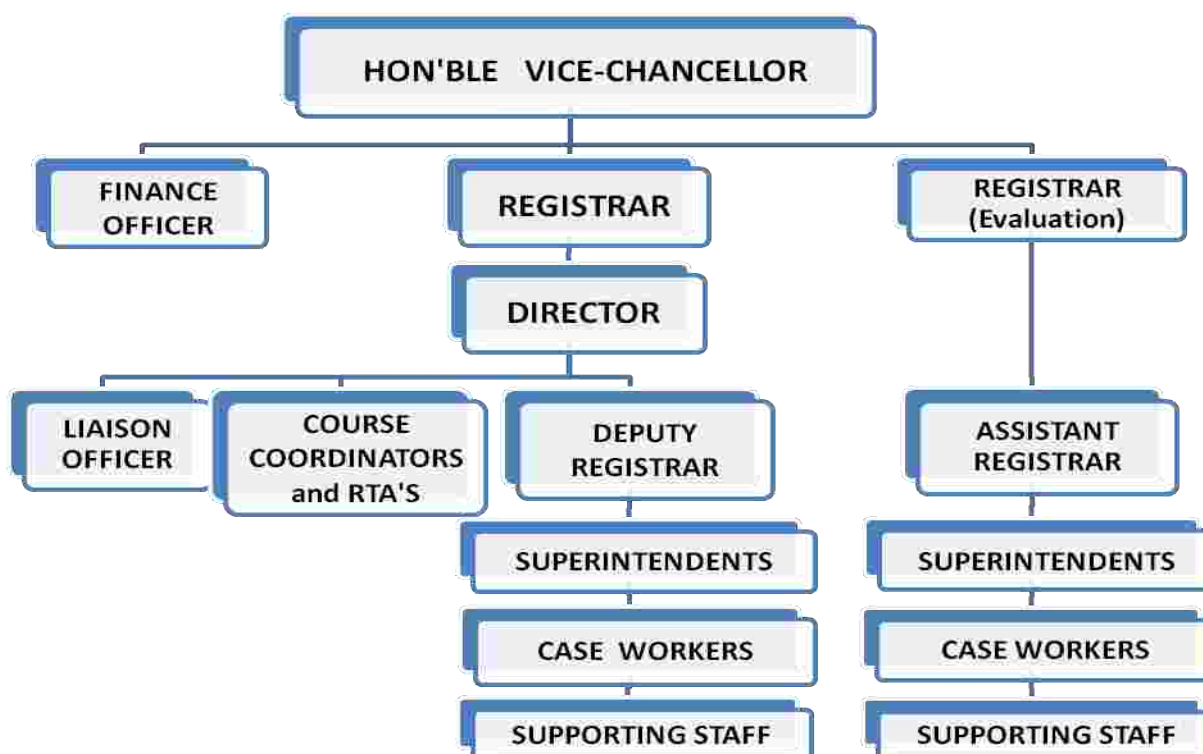
SN	Component	Estimate in Rupees
1	Study Material Development – Course Writer honorarium, Review vetting, editing, SLM conversion etc	3.14
2	Printing and Distribution of SLM	1.88
3	Publicity, Awareness Information Decimation Programmes*	0.05
4	Conduction of Counselling, Orientation/Face to Face/ Practical Sessions etc.	4.04
5	Student Support Services*	0.17
6	TA/DA Meeting Expenses*	0.09
7	Continuous Evaluation / IA	0.10
8	Examination and Certification	1.14
9	Office Automation/ICT/ Communication Related Infrastructure*	0.18
10	Library*	0.16
11	Staff Salaries/ Remunerations/ Other Honorariums – Teaching, Nan-Teaching/Technical/Supporting*	0.55
12	Office Infrastructure*	0.14
13	Laboratory Development and Expenditures	0.32
14	Learner Centre Expenses*	0.12
15	Others – Office Contingence, Post/Courier, Vehicle Maintenance, Fee reimbursement and such others.*	0.24

Note: * costs that will be incurred collectively for all the Programmes, but given here are the fractions of the total, considering 50 students admission to the Programme.

I. QUALITY ASSURANCE MECHANISM AND EXPECTED PROGRAMME OUTCOMES

(a) Organizational Structure, Management and Monitoring Mechanism

The Organizational Structure of the Kuvempu University Directorate of Distance Education (KUDDE) is given below in the form of flowchart.



For the administrative and policy decisions, and reviewing and monitoring of the ODL activities, Kuvempu University has a Monitoring Committee (MC) Chaired by the Honorable Vice-Chancellor. The Registrar, Registrar (Evaluation), Finance Officer, Deans of all the Faculties, Chief Librarian, One Syndicate Member, One Academic Council Member and the Regional Director of the IGNOU, are its members. The Director, DDE is the Organising Member. The operational plans, goals and policies are decided by the MC, and all the decisions and policy matters are placed before the Monitoring Committee before implementation. The Committee normally meets twice a year to review the ODL Programmes and activities.

Academic Advisory Committee (AAC) of the DDE will review the academic programme performance, content delivery mechanism. Issues regarding course content and syllabi revision of all the Programme offered in ODL mode are discussed and decided in AAC. The Registrar will be the Chairman of the AAC, and Registrar (Evaluation), Chairpersons of all BOSs of the concerned Departments will be the members. The Director/ Deputy Director of the DDE is the Organising Member.

All the major decisions including financial, planning and implementation which are discussed in the MC meeting are placed before the Syndicate of the University and after its approval they will come into force.

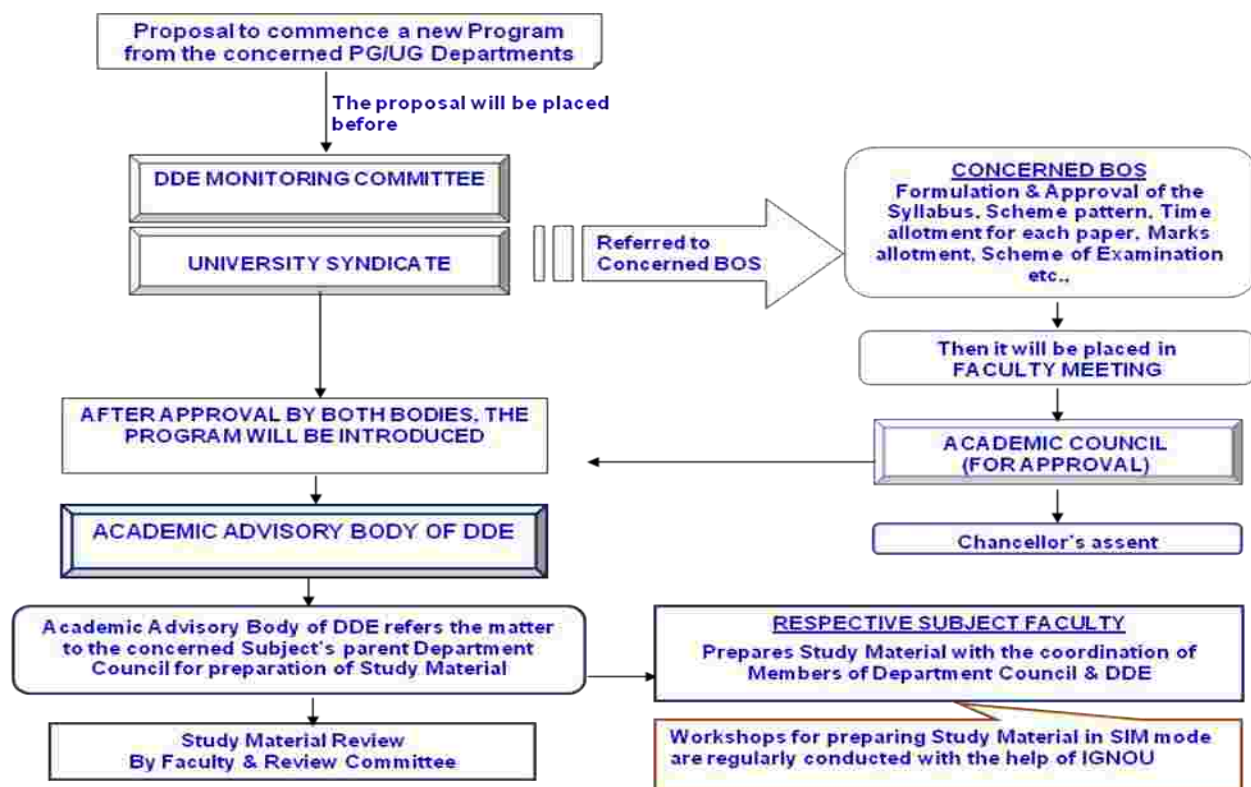
The decisions taken by the AAC are placed through the concerned bodies like, BOS/ Examination wing (for evaluation and certification issues) and finally placed before the Academic Council of the University for its approval.

For the internal quality assurance mechanism there is an Internal Quality Assurance Cell of the University.

(b) Programme Development and Approval Processes:

Proposal from the concerned PG/ UG department to commence a new Programme will be placed before Monitoring Committee of the DDE/ Syndicate. Then it will be referred to the BOS concerned for formulation and approval of the syllabus, programme structure, time allotment for each paper, marks allotment, scheme of examination etc., then it will be placed in the Faculty meeting and then Academic Council for its approval. After approval by both the bodies, the programme will be introduced. The Academic Advisory Body of DDE refers the matter to the concerned Subject’s/ parent Department Council for preparation of Study Material. The concern subject Faculty will coordinate with the DDE and the Department Council, as he/ she is one of the member in it. Workshops for preparing Study Material in SIM mode are regularly conducted (with the help of IGNOU experts) and preparation of course material in SLM mode is in progress.

The various steps involved in programme development, approval and implementation are depicted in the flowchart given below.



(c) Programme Monitoring and Review:

As a part of the regular monitoring mechanism, feedback from the Learners is obtained at the end of each of the face-to-face programmes - both through discussion and through written feedback form. Feedback form includes mainly three aspects – about appropriateness/ usefulness of learning (study) materials, effectiveness of orientation/ face-to-face programmes and internal assessments/continuous assessment process. Learner can give their opinion, suggestions and complaints, if any, through the feedback form. Issues raised in feedback are addressed at appropriate level.

There is also Student Support Service and Grievance Cell in DDE in order to address the day-to-day issues faced by the Learners. The Research and Teaching Assistants at DDE and the Coordinator in the concerned the subjects are available for the learner support services. These apart, regular meetings of concerned faculty are conducted in order to plan the orientation and practical session's activity.

It is the policy of the KUDDE to make available the expert faculty of the PG Departments/ Colleges (for UG) and experts from the sister universities in the state who are regular faculty in the respective subjects for the ODL programmes. The same is followed for the Learner Support Centres (LSC). Programme delivery/academic activities at the LSC are also monitored from the Headquarter.

DDE is organizing Coordinators Meet every year wherein all the issues related to ODL programmes – academic, examination, learners related and administration are discussed and remedial measures are considered under the ODL framework of the university. During the Meet academic activities/learners' issues at the LSC are also reviewed.

Detailed Syllabi of M.Sc. in Biotechnology Programme.

FIRST YEAR

Course 1 : CHEMISTRY OF BIOMOLECULES AND BIOSTATISTICS

Chemistry of Biomolecules

- UNIT 1: Introduction : Importance of Macromolecules in Living System.
- UNIT 2: Carbohydrates : General Characteristics and Classification.
- UNIT 3: Monosaccharides : Configuration, Cyclization, Conformation, Mutarotation and Reactions.
- UNIT 4: Oligosaccharides : Structural Elucidation of Sucrose and Maltose.
- UNIT 5: Polysaccharides : Structural Elucidation of Starch and Cellulose.
- UNIT 6: Amino Acids : General Characteristics, I classification and N-terminal residue determination.
- UNIT 7: Proteins : General characteristics and classification; Primary structure, Secondary Structure, Tertiary Structure and Quaternary Structures.
- UNIT 8: Lipids : General properties and classification, chemistry of fatty acids and triacylglycerides, Chemistry of Lecithin and Sphingomylin.
- UNIT 9: Terpenes : Classification; Chemistry of isoprene and B-sarotene.
- UNIT 10: Sterols : General characteristics and reactions, structural elucidation of Cholesterol.
- UNIT 11: Nucleotides : Structure of ribose, deoxyribose, purines, and pyrimidines, DNA Double helix.
- UNIT 12: Alkaloids : General characteristics, classification and importance. Structure of Piperine and Quinine.

Biostatistics

- UNIT 1: Data Collection and Presentation : Collection, classification, tabulation and presentation of data.
- UNIT 2: Measure of Central Tendency : Mean, median, and mode.
- UNIT 3: Measure of Dispersion : Range, mean deviation, Variance and presentation of data.
- UNIT 4: Measure of Central Tendency : Mean, median, and mode.
- UNIT 5: Measure of Dispersion : Range, mean deviation, Variance and standard deviation.
- UNIT 6: Probability : Definition and theories with examples.
- UNIT 7: Probability Distribution : Binomial, Poisson and normal distribution. Types of errors and levels of significance. Hypothesis testing.
- UNIT 8: Test of Significance : Test based on chi-square (χ^2) and Student 't' test.
- UNIT 9: Correlation and Regression : Correlation, correlation co-efficient, simple linear regression.
- UNIT 10: Experimental Designs : Completely randomized block design (CRD), Randomised Block Design (RBD) and Latin Square Design (LSD) and their importance in biological experiments.

Course 2 : CELL AND MOLECULAR BIOLOGY

- UNIT 1: Structural Organisation of Life : Cell theory, General organisation of prokaryotic cells – and eukaryotic cell. Mycoplasma. Organisation of Virus.

- UNIT 2: Cell Membrane and Cell Wall : Concept of unit membrane, Fluid Mosaic Model and Davson and Danielli Model. Composition of Plasma membrane. Composition of bacterial, fungal and plant cell wall.
- UNIT 3: Cytoplasm : Introduction, Cytoskeleton, Endoplasmic reticulum, Golgi complex; Mitochondria, Chloroplast, Lysosomes, and peroxisomes.
- UNIT 4: Nucleus and Chromosomes : Nuclear envelope, Nuclear matrix, Nucleolus, Chromosomes – Macromolecular organization, Centromere, Telomere, Satellites; Polytene and Lampbrush chromosomes.
- UNIT 5: Cell Division and Cell : Mitosis and Meiosis, Phases of cell cycle – Interphase, G1 S and G2 Phase.
- UNIT 6: Genetic Material : Chemical Structure of DNA, types of DNA; RNA: mRNA, rRNA and tRNAs.
- UNIT 7: DNA Replication and Repair : Process of Replication; DNA Repair –Excision repair, Photoreactivation.
- UNIT 8: Transcription : Regulatory regions of a gene, central Transcription in prokaryotes – Initiation, elongation and termination. Post-transcriptional modifications -5' capping, Polyadenylation and RNA splicing.
- UNIT 9: Translation : Protein synthesis, Activation of amino acids, Initiation, elongation and termination.
- UNIT 10: Genetic Code : Features, Deciphering the code.
- UNIT 11: Regulation of Gene Expression : Lactose operon, Tryptophan operon and Attenuation control.

Course 3: MICROBIOLOGY AND IMMUNOLOGY

Microbiology:

- UNIT 1: Introduction : Microorganisms, their characters and habitat.
- UNIT 2: History : Historical development of various fields of microbiology. Contributions of Robert Hook, Leevenhoek, Jenner, Koch, Pasteur, Lister, Behring, Iwanosky, Beijernick Germ theory of disease.
- UNIT 3: Classification : Major groups of microorganisms and their classification. Structure, nutrition, growth and reproduction in protozo, fungi, algae, bacteria, Mycoplasma, Rickettsia, Virus; Viroids and prions.
- UNIT 4: Concept of Sterilization : Methods of sterilization- Dry and wet heat sterilization, Radiation, Chemicals and filtration. Techniques of isolation, culturing staining, identification, preservation of microorganisms from atmosphere, soil and water. Impact of microorganisms on agriculture, food and dairy industry.
- UNIT 5: Health Care Microbiology : (Distribution, disorder and control – brief account)
- i. Bacterial Diseases of man:
 - a) Air borne bacterial diseases tuberculosis and pneumonia.
 - b) Food and water borne diseases-Typhoid and cholera.
 - c) Soil borne disease-Tetanus.
 - d) Sexually transmitted diseases-Gonorrhoea and Syphilis.
 - e) Contact disease-leprosy.
 - ii. Fungal diseases of man: Dermatomycosis and Systemic mycosis.
 - iii. Protozoan diseases of man: Amoebiasis and Malaria.
 - iv. Viral diseases of man: Dengue, Rabies, Polio, Hepatitis, AIDS and Ebola.

Immunology:

- UNIT 1: Introduction : History and Scope.
- UNIT 2: Immunity : Innate and acquired Immunity. Active Immunity and passive immunity _ Natural and artificial.
- UNIT 3: Cells of the Immune System : T-cells, B-cells, macrophage, helper cells, killer cells, stem cells, lymphoid lineage-lymphocytes, null cells; myeloid lineage-monocytes, polymorph nuclear cells, mast cells, antigen presenting cells.
- UNIT 4: Antigens : Antigens and haptens, a comparison; epitopes and paratopes, chemical nature of antigens and antigenic determinants, factors influencing antigenicity – size, chemical nature, solubility, foreignness; types of antigens-cross reactive antigens, heterophile antigens, T-cell dependent and T-cell independent antigens.
- UNIT 5: Antibodies : Immunoglobulins and antibodies. Basic structure of the immunoglobulin, immunoglobulins-class, structure, biological properties and functions.
- UNIT 6: Antigen (Ag)- Antibody (Ab) reactions : Features, specificity, binding sites and binding forces. Types and detection of Ag-Ab reaction-precipitation, agglutination, cytolysis, flocculation, opsonization, immunofluorescence.
- UNIT 7: Complement : Salient features, origin, activation; pathways-classical pathway, alternate pathway; biological functions and fixation.
- UNIT 8: Hypersensitivity: Factors causing hypersensitivity, common reactions, classification of allergic and contact dermatitis.
- UNIT 9: Tumor Immunology and Immunodiagnosis : Properties of tumor cells, causes of tumours, tumor antigens, immuneresponse and immunodiagnosis of tumors, immunotherapy, immunodeficiency diseases, immunodiagnosis of infectious diseases.

Course 4: BASIC ENZYMOLOGY

- UNIT 1: Introduction : Historical perspective, classification, nomenclature and properties of enzyme.
- UNIT 2: Isolation of Enzymes : Extraction methods for homogenization and separation, purification and characterization of enzymes, criteria of purity of enzymes.
- UNIT 3: Enzyme Kinetics : Kinetics of enzymatic reaction. Derivations of Michaelis-Menten, Lineweaver-Burk Plot and turnover number.
- UNIT 4: Enzyme Catalysis : Active site and regulatory site. Chemical catalysis, effect of pH and temperature on enzymatic reaction, binding modes of catalysis.
- UNIT 5: Mechanism of Action : Mechanism of enzyme catalyzed reaction, Action of Lysozyme and chymotrypsin, RNA as an enzyme.
- UNIT 6: Membrane Bound Enzymes : Extraction, assay and lipid-protein interaction.
- UNIT 7: Enzyme Inhibitors and Immobilized Enzymes: Irreversible and reversible enzyme inhibition-competitive inhibition, uncompetitive inhibition and noncompetitive inhibition. Methods and effect of immobilization, application of immobilization.
- UNIT 8: Regulation of Enzyme Activity : General properties of Allosteric enzymes, theories of allosteric regulation. MWC and KNF models.
- UNIT 9: Co-Enzymes : Action of NAD, FAD, FMN, TPP, PLP, Co A, and Vitamin B₁₂. Isoenzyme and Multienzyme complex. Semisynthetic Enzyme.
- UNIT 10: Application : Determination of enzyme activities for clinical diagnosis. Enzyme therapy and enzyme engineering.

SECOND YEAR

Course 5: CELL AND TISSUE CULTURE TECHNOLOGY

Plant Tissue Culture :

- UNIT 1: Introduction : Historical perspective and scope.
- UNIT 2: Culture Media : Composition and preparation of MS, B₅ nitsh and white's media, Sterilization of media.
- UNIT 3: Culture Condition : Effect of p^H, Light, Temperature and humidity on media; Carbon sources of media.
- UNIT 4: Callus Culture : Initiation and maintenance of callus.
- UNIT 5: Organogenesis : Adventitious organogenesis – Rhizogenesis and Caulogenesis. Factors affecting organogenesis.
- UNIT 6: Cytodifferentiation : Factor affecting cytodifferentiation and organ formation somaclonal variations.
- UNIT 7: Somatic Embryogenesis : Introudcation and development factors affecting somatic embryogenesis. Synthetic seed and its applications. Cryopreservation of tissue culuture plants.
- UNIT 8: Anther and Pollen Culture : Protocol for anther and pollen culture. Production of haploid plants.
- UNIT 9: Protoplast Culture : Culture and fusion of protoplast, regeneration of hybrid plants, cybrids.
- UNIT 10: Secondary Metabolities : Synthesis of secondary metabolites and the scope.
- UNIT 11: Transgenic Plants : Gene transfer techniques-Agrobacterium mediated, vector mediated and direct gene transfer; markers for transformation, Applications of Transgenic plants.

Animal Cell-Culture :

- UNIT 1: Animal Cell-ulture : Histrocal perspectives, Development and scple.
- UNIT 2: Cell Culture Media : Essential feratures of culture medium, Balanced salt solutions, Natural media, Synthetic media-Simple and Growth media, serum free medium.
- UNIT 3: Primary Explanation Techniques : Preparation of slide cultures, carrel flask technique, whole embryo cluture, Suspension culture of blood leukocytes; Cryopreservation of cells.
- UNIT 4: Cell Differentiation and Transformation : Concept of cell differentiation, cell Transformation: Definition, Phenotypic alterations and characteristics of transformed cells; Maintenance of cell lines.
- UNIT 5: Scaling up of Animal Cell Cultures : General methods and culture paramenters; Monolayer cultures-Roller bottle, Unit process system and microcarrier cultures; Suspension cultures-Stirred bioreactors, Airlift fermentors, Porous carriers.

Course 6: INDUSTRIAL AND ENVIRONMENTAL BIOTECHNOLOGY

Industrial Biotechnology :

- UNIT 1: Introduction : Screnning, isolation, development and preservation of industrially important microorganisms. Characteristics of ideal media and requirement of materials development for industrial fermentation.
- UNIT 2: Fermentation Technology : Design and configuration of Batch, fed batch and continuous fermentors; Sterilization of fermentor, measurements and control of bioprocess parameters, scaling up of fermentation products.

- UNIT 3: Bioreactors : Types of bioreactors, aeration and agitation devices, maintenance of aseptic condition, addition of inoculums and nutrients, sampling, from control, monitoring and control of various parameters.
- UNIT 4: Processing : Removal of microbial cells and solid matter, foam precipitation, filtration, centrifugation, cell proteins, extraction, drying and crystallization.
- UNIT 5: Single Cell proteins : Bacterial, algae, yeast and fungal proteins. Economics and scope of single of single cell proteins in industry.

Environmental Biotechnology :

- UNIT 1: Environmental Pollution and Monitoring : Air, water, soil and noise pollution and their possible control by biotechnological methods.
- UNIT 2: Sewage and Effluent as Pollutants : Conventional treatment methods, Modern methods – Aerobic and anaerobic treatment, waste water management.
- UNIT 3: Bioenergy from Wastes : Biomass as energy producer, biogas, biomethanisation, bioalcohol, biomass, biohydrogen and hydrocarbons from plants.
- UNIT 4: Bioremediation : Types of bioremediation, bioremediation of surface soil, sludges and subsurface materials; bioventing plumes treatments, oils spill removal: scope and limitations of Bioremediation.
- UNIT 5: Bioleaching : mechanisms of bioleaching, bioleaching of copper, gold and silver; microorganisms involved in leaching.
- UNIT 6: Hazardous Waste Management : Xenobiotic compounds, recalcitrant materials and hazardous wastes; Application of Biotechnology in degrading hazardous wastes, cyanide, oxide, urea, petrochemical effluents and phenols.
- UNIT 7: Transgenic Organism as Pesticides : Insecticidal activities of Hausgenic organisms; effectiveness and Controversy regarding Bioageut.
- UNIT 8: Ecofriendly biotechnology and Environmental Legislation : Vermicomposting: method and application; Biodegradable plastics, Environmental legislation in India and other countries.

Course 7: COMPUTER APPLICATION AND BIOINFORMATICS

Computer Application :

- UNIT 1: Introduction : Evolution, application, adwantages and limitations of computers.
- UNIT 2: Types of Computers : Micro, Mini, Mainframne and super computer.
- UNIT 3: Organisation of Computer : CPU, memory unit, Auxillary storage devices, input devices, output devices.
- UNIT 4: Operating System : Definition, types and functions of operating system.
- UNIT 5: MS DOS : Internal and External commands.
Introduction to GUI, Windows-98/2000. Basic Commands of Windows.
- UNIT 6: MS Office Software : Word-processing and Spread sheets.
- UNIT 7: DBASE III plus : Brief account on command mode.

Information Technology & Bioinformatics :

- UNIT 8: Introduction : Historical background and definition of information technology.
- UNIT 9: Data Bases : Definition, concept and types.
- UNIT 10: Networking : Definition and types – LAN, MAN, WAN.
- UNIT 11: Internet and e-mail : Importance and protocols.
- UNIT 12: Algorithms : Characteristics and properties.
- UNIT 13: Flowchart : Symbols, branching and looping.
- UNIT 14: Bioinformatics : Definition, aim, history and scope.

- UNIT 15: Genome analysis : Molecular mapping, chromosome walking, human genome analysis.
- UNIT 16: Genomics : Bioinformatics databases, Data base submission, data retrieval, methods of alignments, sequence analysis and softwares used in genomics.
- UNIT 17: Proteomics : Protein structure overview, Primary sequence database, composite sequences data base, pattern analysis (Secondary data bases), composite pattern data bases, protein structure visualization, protein structure prediction, protein function prediction.
- UNIT 18: Chemo informatics, Drug Designing, Microarrays and DNA chips (only brief account).

Course 8 : RECOMBINANT DNA TECHNOLOGY

- UNIT 1: Introduction : Historical perspectives and scope of Recombinant DNA technology.
- UNIT 2: Molecular Tools : Restriction endonucleases, DNA ligase, DNA polymerase and Reverse transcriptase.
- UNIT 3: Cloning Vectors : Properties and types of cloning vectors. plasmid Cosmid, Animal viruses Single stranded DNA phages, Yeast vector Ti-plasmid Lambda phage and natural vectors.
- UNIT 4: Gene Cloning : Generation of DNA fragment, recombining DNA fragments to vectors, Delivery/ Introduction of recombinant molecules, screening of recombinant DNA.
- UNIT 5: eDNA Library : eDNA synthesis- mRNA enrichment, reverse transcription, DNA primers, cDNA library construction and screening.
- UNIT 6: Blotting Techniques: Southern, Northern and Western, blotting technique Gel retardation.
- UNIT 7: Mapping the DNA : Restriction mapping, DNA Sequencing fluorescent technique and Gel retardation.
- UNIT 8: DNA Amplification : Polymerase Chain Reaction (PCR) and its application. Synthesis of biomolecules and super Drugs – Insulin and growth hormone, interferons, vaccines and monoclonal antibody production.
- UNIT 9: Cloning of Animals : process of cloning with examples (eg, Dolly)
- UNIT 10: Public perception of Biotechnology : public awareness, ethics, Socio – economics and legal issues, regulatory requirements and policy making.
- UNIT 11: Patents : History of patent concept, patenting process, Inventors and Owner of invention ; patenting of genetically engineered organisms, Biopiracy.
