AGENDA

5TH MEETING OF THE ACADEMIC COUNCIL

22ND DECEMBER, 2014, 11:30 A.M.

CENTRAL UNIVERSITY OF JAMMU

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5th Meeting of the Academic Council
December 22nd, 2014 at 11:30 AM

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Item No. 01

To consider report of the Vice Chancellor about the developments since the last Meeting of the Academic Council held on 30th June, 2014.

After completion of the term of the First Vice Chancellor Dr. S.S. Beloria, and in pursuance of letter No. F.No. 52-4-2014-CU-III (Pt.) dated 07.08.2014 of Deputy Secretary, Ministry of HRD, Govt. of India, Professor Devanand took over the charge as In-charge Vice Chancellor of the Central University of Jammu w.e.f. 07th August, 2014.

During the period of six months, since the last meeting of the Academic Council held on 30th June, 2014, various initiatives were undertaken. During this period main attention remained on Campus development at the allotted site at village Bagla, Tehsil & District Samba.

The work which was in progress was monitored at regular intervals. Meetings with higher officials of EPIL (consultancy engaged for the project) were held to impress upon early completion of the allotted work. Chairman-cum-Managing Director of EPIL also paid visit at the Project site and he was apprised of the slow pace of work and the Vice Chancellor emphasized upon them to accelerate the pace of work for early completion. The EPIL was also categorically told that due to inordinate delay the University could not start its academic activities relating to the four new academic programmes at the campus site.

Faculty and Employees of the University contributed their one day's salary to the Prime-Minister's Relief Fund keeping in view the recent National Calamity which caused colossal loss to the Human and Infrastructure in the State of J&K.

Admissions

Admission process for the Academic Session 2014-15 for Post-Graduate and Integrated M.Phil.-Ph.D. programmes was finalized by the respective schools during the period under report. In 12 Master Degree Programmes for which admission announcement was advertised for a total of 360 seats (30 Seats in each Post-Graduate Programme), 257 students have been admitted in PG programmes. 39 students have been admitted in Integrated M.Phil.-Ph.D. Programme.

In Part time Ph.D. Programme, which has been started for the first time in the Department of National Security Studies and the Department of Public Policy and Public Administration, 8 Scholars have been admitted with four scholars in each Department.

Meetings of Authorities of the University

Finance Committee

- 7th Meeting of the Finance Committee was held on 05th November, 2014 at Association of Indian Universities House, Delhi.

Boards of Studies

- Meeting of the Board of Studies of the Department of Educational Studies was held on 23rd August, 2014.
- Meeting of the Board of Studies of the Department of Tourism & Travel Management was held on 25th September, 2014.

Important Meetings

- On 20th August, 2014, Prof. Devanand, the Vice Chancellor met the Hon'ble Minister, HRD, Govt. of India, at Jammu and briefed her about the ongoing construction and other academic activities in the University.
- Prof. Devanand, I/c Vice Chancellor attended one-day workshop at Delhi on "Ranking Process" organized by the Department of Higher Education on 21st August, 2014.
- He also attended the Retreat of Vice Chancellors of Central Universities, Chaired by the Hon'ble Union Minister, Human Resource Development at Chandigarh on 12th-13th September, 2014.
- On 15th September, 2014, the Vice Chancellor participated in the meeting at Vigyan Bhawan, New Delhi regarding strengthening the Department of Teachers Education convened by University Grants Commission.
- On 3rd October, 2014 Prof. Devanand, I/c Vice Chancellor met the Hon'ble Chancellor at Srinagar and briefed him about the latest Academic and Development activities of the Central University of Jammu.

Workshop/Seminar/Events organised

- Induction Day Programme was held on 05th August, 2014, for the four new departments; viz. (1) National Security Studies; (2) Public Policy and Public Administration; (3) Sociology and Social Work and (4) Mass Communication and New Media.
- Mr. Rashid Ali, Assistant Professor in the Department of Mass Communication and New Media delivered a lecture on the topic "Myths of Communication" on 05th August, 2014, under the aegis of Lecture by Faculty of Central University of Jammu.
- The Department of English organized a two-day National Seminar on "The Great War of 1914- Hundred Years and Beyond: Cultural and Literary Responses", on 3rd-4th September, 2014.
- On 18th-19th September, 2014, "Awareness Programme Prohibiting use of Polythene Bags" and "Polythene Free Campus" was held at Temporary Academic Block of Central University of Jammu.
- The Department of Tourism and Travel Management, Central University of Jammu celebrated World Tourism Day on 27th September, 2014. The University devoted a week long celebrations starting from 22nd–27th September, 2014 to spread awareness about tourism as a vehicle for community development, based on the theme- "Tourism and Community Development".

- A visit to heritage sites of Jammu was conducted on 23rd September, 2014, wherein Dr. A. K. Khana, Superintendent, Archaeological Survey of India, interacted and briefed the faculty and students on the importance of these monuments for preserving the cultural heritage.

- Department of Tourism and Travel Management of Central University of Jammu in a significant event entered into a Memorandum of Understanding (MoU) with Indian Institute of Tourism and Travel Management, Gwalior, an organization of Ministry of Tourism, Govt. of India. The MoU was signed by Prof. Deepak Raj Gupta, Dean & Head of the Department of Tourism and Travel Management and Prof. Sandeep Kulshreshta, Director, IITTM, Gwalior on 24th September, 2014.

- Department of Human Resource Management & Organisational Behaviour organised a Workshop from 13th-15th October on "Effective Communication and Presentation Techniques". Prof. P. Bhattacharya, Senior Programme Manager at Version Data Services India Pvt. Ltd. was the resource person.

- Department of English and Comparative Literature organized a Seminar on "Dowry Murder: Gender Prejudiced Practices" on 28th October, 2014.

- A 3-day National workshop on "Scholarly writings and Plagiarism Key Concern" was organised by the Department of Human Resource Management and Organisational Behaviour from 29th-31st October, 2014.

- A panel discussion on "LOC Crisis: Way Ahead" was organised by the Central University of Jammu on the 7th November, 2014, with Prof. Sanjay Chatturvedi, Director, Centre for the Study of Mid-West and Central Asia, Punjab University, Chandigarh.

- A discussion on "Shikshit Bharat, Saksham Bharat – Quality Education for All" on the International Students' Day was organized by the University on 17th November, 2014 for students' new ideas and new ways of moving forward.

- A 4-day workshop on "Hindi Training" was organised by the Central University of Jammu from 6th-9th December, 2014 for teaching and non-teaching employees.

- The Central University of Jammu is observing 24th December, 2014 as Good Governance Day to commemorate the Birth Anniversary of Hon'ble former Prime Minister Shri Atal Bihar Vajpayee.

Hindi Pakhwara

A two-day Workshop on 23rd-24th September, 2014, was organised for the Non-Teaching staff and officers of the University. In this workshop the subject experts Dr. Puran Chand Tondon, Associate Professor Delhi University, Dr. Rakesh Kumar, Assistant Director, Central Hindi Directorate, Dr. Harish Kumar Sethi, Assistant Professor, IGNOU and Dr. Amar Singh, Senior Hindi Officer, Jammu, imparted training in Hindi Noting, Drafting and Hindi Official Vocabulary with a view to enhancing their capacity to use Hindi in the official work.

At the end of the Workshop a Test was conducted. Those who scored Ist, IInd and IIIrd positions were given cash prize in both the categories i.e. those from Hindi speaking areas and Non-Hindi speaking areas. The Vice Chancellor and the Registrar gave the Certificates of participation to the participants.

A one-day Seminar on *"Rajbhasha Hindi Ke Prachar evm Prasaar ki Vyavharik Samsya"* as part of Hindi Pakhwara was held on 30th September, 2014. Prof. Raj Kumar, Prof. P.N. Trisal, Dr. Bharat Bhushan Sharma, and Dr. Amar Singh were the invited experts on this occasion. They expressed their views on the difficulties in the use of Hindi in office work and also suggested solutions for popularising usage of Hindi. On this occasion an office file was inaugurated by the Vice Chancellor for providing Hindi vocabulary as ready reference to officers and staff to promote use of Hindi.

Independence Day Celebration

The Central University of Jammu celebrated the Independence Day on 15th August, 2014 at the Administrative Block and Temporary Academic Block of the University. At TAB the Vice Chancellor hoisted the National Flag. The function was attended by students, faculty, staff and officers with full zeal and high patriotic spirit.

***Swachh Bharat Abhiyan* (2nd October, 2014)**

The Central University of Jammu also initiated the *Swachh Bharat Abhiyan* on 2nd October, 2014, to celebrate the Birth Anniversary of Mahatma Gandhi, the Father of Nation, in pursuance of the guidelines received from the MHRD in this regard.

The Vice Chancellor, administered the oath of cleanliness to the students, faculty, staff and officers of the University to keep the campus and its surroundings clean. Thereafter, cleanliness drive was initiated at Temporary Academic Block on 2nd October, 2014. The Registrar, faculty members and students also took the drive for *Swachh Bharat Abhiyan* at the campus site at village Bagla, Distt. Samba. The students and faculty made posters, wrote slogans, campaigned for a clean Bharat and created awareness in and around the campus stressing the need for maintaining the cleanliness.

Rashtriya Ekta Diwas

Rashtriya Ekta Diwas was observed on 31st October, 2014 to commemorate the 139th birth anniversary of Sardar Vallabhbhai Patel in pursuance of MHRD guidelines. The Central University of Jammu organised a Symposium on the Life and Works of Sardar Vallabhbhai Patel at the RS Memorial Govt. Higher Secondary School in village Raya. The function was also attended by children from other schools such as Middle, Secondary and Higher Secondary Schools in the area. Prof. N.R. Sharma, Dean Student Welfare and Prof. Deepak Raj Gupta, Academic Administrator were the key resource persons in organising the event.

On 31st October, 2014, at 11:00 A.M. the oath was administered to the students, faculty, staff and officers in connection with Unity and Integrity of the country at the Temporary Academic Block of the University.

A 'Run for Unity' was also organised in the Sainik Colony with the participation of students, faculty, staff and officers of the University.

Further, a Documentary Film on Sardar Patel's Life & Works was shown to the students, faculty staff and officers in the Auditorium of the University.

National Education Day

The Central University of Jammu celebrated the National Education Day on 11th November, 2014, to commemorate the birth anniversary of Maulana Abul Kalam Azad, the first Union Minister of Education, Govt. of India.

The members of the teaching faculty, officials, scholars and students of the University were invited to present their views on his life and works. Students and Scholars presented their views on various aspects of the personality of Maulana Abul Kalam Azad. The Registrar and the Dean Students Welfare also addressed the students on this occasion. The Vice Chancellor delivered his Presidential address.

Alumni Meet

The University celebrated the annual event with Old Students 'Old Students Day' on 01st December, 2014.

Establishment of Self-Financing Unit (SFU) of NSS

The University has received letter F.No. 14-1/NSS/RCD/2011/73 dated 27th October, 2014, from Deputy Programme Adviser, Ministry of Youth Affairs & Sports, Govt. of India, conveying grant of National Service Scheme to the Central University of Jammu. The Ministry vide above referred letter has granted one NSS Units of 100 volunteers on the Self-Financing Basis to Central University of Jammu. These units will directly work under the NSS Regional Centre, Delhi.

Students Achievements

30 students qualified JRF/NET/SET across the Department as shown below:-

Department	NET JRF	NET	SET	Total
Educational Studies	05	09	02	16
MBA (TTM)	02	04	-	06
Economics	01	03	01	05
Environmental Science	-	01	01	02
English	-	-	01	01
Total	08	17	05	30

Cultural and Co-Curricular Activities/Functions Organised

- A function to felicitate the meritorious students of the Academic Sessions 2011-12, 2012-13, 2013-14 was held on 5th August, 2014.

- The Foundation Day of the University was celebrated on 2nd September, 2014 at TAB. Various Cultural activities were organized and presented by the Students. The Vice Chancellor, the Academic Administrator and the Registrar and Dean Student's Welfare addressed the students on this occasion and emphasized the need for overall development of personality of the students for becoming the responsible citizens of the society.

Eminent Lecture Series

- On 25th August, 2014, Sh. Subhash Jagotia, Executive Director, Global Business Solution delivered a lecture on "Dynamics of Success" at Temporary Academic Block.

- On 25th September, 2014, Mr. Nitin Sinha, Conservation Architect, ACOMOS India, delivered a lecture on "Conservation and Preservation of Heritage" in the University.

- On 26th September, 2014, Prof. I.C. Gupta, former Director Faculty of Management and Tourism Studies Devi Ahilya University Indore, delivered lecture on Recent Trend and Innovations in Tourism and Hospitality Industry.

- On 30th September, 2014, Mr. Vikrant Mahajan delivered a lecture on "Super positivity - The Ultimate power of Success and Happiness".

- On 7th November, 2014, Prof. Sanjay Chaturvedi, Director-Centre for study Mid-West and Central Asia, delivered a lecture under Eminent Lecture Series on topic "Competing Regionalism in the Indian Ocean: The rise of the Indo-Pacific".

- On 10th December, 2014, Sh. S.K. Jain, delivered a lecture on "Stress Management".

Visit of Outside Experts

- Mr. Sanjay Jeena, MD, Travel Merchant, Jammu visited the University on 28th August, 2014. He interacted with the MBA (TTM) students on the topic – "How to Start a Travel Company?"

- Mr. Manjot Gill, CEO, Mind Bridge Asia and Trainer and Consultant by profession in soft skills, visited the Department of TTM on 18th September, 2014. He had an interactive session with the first semester students of MBA (TTM) and MBA (HRM) on "Power of Communication".

Recruitment of faculty on contract

- Term of six faculty members were extended upto 31/12/2014 on contractual basis. One Assistant Professor in the Department of Mathematics, One Assistant Professor in the Department of Human Resource Management & Organizational Behaviour, One Assistant Professor in the Department of Economics, Two Assistant Professor in the Department of Environmental Sciences.

- Prof. L.S. Ghandi Doss has joined as Professor on contract basis in the Department of Sociology and Social Work.

School Children visit to Campus Site

On 13th December, 2014 around 150 School Children from Naveen Shiksha Kendra High School, Channi Himmat, Jammu being run by Sawera NGO, visited the Central University of Jammu Campus Site, Bagla, Dist. Samba. Students were taken around the Campus area and briefed about the development activities being

undertaken by the University in the first phase. Students were accompanied by Dr. Gurmeet Singh, President, Naveen Shiksha Kendra and Teaching Staff of the school. Students enjoyed the visit and were very joyful to see and experience the serene and beautiful environment of the University. Sh. Jit Singh, Registrar, Central University of Jammu and Sh. V.K. Gupta, Campus Administrator were also present during the visit, and encouraged the students for higher studies.

Support from UGC

The University received Rs. 210.00 crore during the 12th Five Year Plan against the approved allocation of Rs. 388.50 crore. The year wise breakup is as follows:-

Financial Year 2012-13	-	Rs. 30.375 crore
Financial Year 2013-14	-	Rs. 50.00 crore
Financial Year 2014-15	-	Rs. 129.625 crore (upto 31/10/2014)

Status of Land and Infrastructural Development of the University

a) Status of Land and infrastructural Development of the University

The Central University of Jammu has now been in possession of entire land measuring 4880 Kanal 19 Marlas which stands handed over by the State Govt. The University was handed over the land in installments and the last patch of land was taken over on 31st July, 2014. The breakup of the said allotted land is as under:

1.	State/ Forest Land	4254 Kanal 14 Marlas
2.	Evacuee's Property	41 Kanal 19 Marlas
3.	Private Land	584 Kanal 06 Marlas
	Total:-	4880 Kanal 19 Marlas

b) Infrastructure Development Initiatives at the Campus Site Village Bagla, Samba.

The University had identified and decided to take up the construction of such buildings, which could be completed up to ending June, 2014, named it as sub-phase-I of Phase-I of the Campus development. The buildings identified to be taken up for construction as first priority are the Directorate of Distance Education and approximately 60 quarters of Professors/Associate Professors/Assistant Professors along with associated services and approach roads in order to make these buildings functional and habitable. With completion of the said two types of buildings, the University intends to commence the additional academic activities of four new Departments in the campus during the next Academic Session. The same would also cater to the immediate hostel needs of the students by modifying the Professors quarters and also provide residential facility during 2015-16 session. Though pace of construction has not matched with the University's requirement and planning, yet efforts are being made to get the immediately required buildings completed before the revised time period of Jan 2015.

The Executive Council, on recommendations of the Finance Committee, has approved the budget estimates of the phase-I and sub-phase-I of the development of the University Campus in its meeting held on 29th June, 2013 for an amount of Rs. 1187.91 Crores and Rs. 116.29 Crores respectively. Accordingly, EPIL (approved PMC) was conveyed the approval to initiate the tendering process. M/s EPIL has floated the tender for the work of sub-phase-I and part of phase-I the lowest bidders. M/s Nagarjun Construction Corporation Ltd (NCCL) was adjudged as the lowest bidder for sub-phase-I. The University, after seeking justification from the PMC, approved the contract.

The work is in progress and every effort is being made to complete the sub-phase-I within the revised timeline. The University has identified and prioritized the construction of such buildings and infrastructure out of the phase-I in order to make the Campus functional within a short span of time in commensuration with the availability of the funds. Tender for the Road Network and Utilities, vital for shifting to the campus has also been approved for allotment at a cost of Rs. 264.98 Crores in favour of a reputed construction agency namely M/s SEW Infra Ltd. Hyderabad. The work for the External Electrification has also been finalized and allotted to M.s Anil Kumar & Co. Gaziabad valuing Rs. 43.99 Crores. Both the works are in progress.

Apart from allotment of land for the Campus development, the State Government is committed to provide basic infrastructure in terms of power, water and suitable road access up to the Campus site. Though, the State Government is alive to the commitment as mentioned above, yet the proposals are still in infancy. University has a regular follow-up with the State Govt. through Chief Secretary, Planning Commissioner and concerned administrative heads but the same has also not met with success.

The issue has also been brought to the notice of the union HRD Ministry for its intervention, but still no tangible result is visible on ground.

Item No 02

To consider confirmation of the Minutes of the 4th meeting of the Academic Council held on 30th June, 2014.

Minutes of meeting of the Academic Council held on 30th June, 2014 have been circulated among the members of the Academic Council vide No. CUJ/Regr./AC-Meet/2014/2537 to 2556 dated 11.07.2014. No comments/ observations have been received from the members. The minutes as circulated may be confirmed.

Item no. 03

To consider the "Action Taken Report" in pursuance of the decisions taken in the Academic Council meeting held on 30th June, 2014.

Action taken Report in respect of minutes of the meeting of Academic Council meeting held on 30th June, 2014 in the Committee Room, Administrative Block, Central University of Jammu, Trikuta Nagar, Jammu.

S. No.	Item	Resolved	Action Taken
1.	Considered the report of the Vice Chancellor about the developments since the last Meeting of the Academic Council held on 25th November, 2013.	Resolved to adopt the report of the Vice Chancellor regarding the development activities of the University since the last meeting of the Academic Council, held on 25th November, 2013, as given in Agenda Item No. 1, in view of the aforementioned deliberations, and the same be placed on record.	Recorded
2.	Considered confirmation of the Minutes of the meeting of the Academic Council held on 25th November, 2013.	Resolved that the Minutes of the 3rd Meeting of the Academic Council held on 25th November, 2013, as already circulated vide letter No. CUJ/Regr/AC-meet/ 2013/5308-5327 dated 01/12/2013, be confirmed.	Recorded
3.	Considered the **"Action Taken Report"** in pursuance of the decisions taken in the Academic Council meeting held on 25th November, 2013.	Resolved that the "Action Taken Report" in respect of the 3rd Meeting of the Academic Council held on 25th November, 2013, be recorded.	Recorded
4.	Considered confirmation of the action taken by the Vice Chancellor in having authorised starting of Part-time Ph.D. Programme for In-service Academic and Administrative Personnel in the Departments of National Security Studies, and Public Policy and Public Administration from the Academic Session 2014-15.	Resolved to confirm the action taken by the Vice Chancellor in having authorized starting of Part-time Ph.D. Programme for In-service Academic and Administrative Personnel in the Departments of National Security Studies, and Public Policy and Public Administration from the Academic Session 2014-15.	Recorded

		Further resolved to authorize the Vice Chancellor to modify the eligibility condition to include other Master's degrees in respect of in-service category of candidates. Also resolved to authorise the Vice Chancellor to extend the date for receipt of applications from the candidates for the part-time Ph.D. programme.	Notification in this regard was issued vide Notice No. CUJ/2014/ 5079 dated 08.09.2014
5.	Considered confirmation of the action taken by the Vice Chancellor in having adopted University Wide Elective Courses in anticipation of approval of the Competent Authority.	Resolved that the action taken by the Vice Chancellor in having adopted University Wide Elective Courses (as per Annexure – I in Agenda item No. 05) be confirmed.	Notification F.No. 4-29 (Acad-Syllabi/CUJ/ Regr/2014/2582-2608 dated 14.07.2014 has been issued.
6.	Considered confirmation of the action taken by the Vice Chancellor in having authorized adoption of the syllabi & courses of study of Master's Degree Programme in Environmental Sciences, Semester IV for the Academic Session 2013-14, in anticipation of approval of the competent authority.	Resolved that the action taken by Vice Chancellor in having authorized adoption of the syllabi & courses of study of Master's Degree Programme in Environmental Sciences, Semester IV (as per Annexure – II in Agenda Item No. 06) for the Academic Session 2013-14, be confirmed.	Notification F.No. 4-29/ Acad-Syllabi/2014/ 12626-52 dated 15.07.2014 has been issued.
7.	Considered nominating one person on the Committee on Equivalence and Recognition of Examinations/ Degrees.	Resolved to authorise the Vice Chancellor to nominate one person on the Committee on Equivalence and Recognition of Examinations/Degrees in terms of Clause 1 (b) of Ordinance No. 48.	Notification F.No. 4-31(Exam)/CUJ/Regr/2014/5286-5315 dated 10.09.2014 has been issued.
8.	Considered nominations of three experts, not in the service of the University, having special knowledge and experience of the subject as members for each School Board.	Resolved to authorise the Vice Chancellor to nominate three experts, not in the service of the University, having special knowledge and experience of the subject as members for each School Board in terms of Clause (f) of Ordinance No. 14.	Notifications in this regard have since been issued as per details give below: - **School** / **Notification No.** School of Humanities and Social Sciences / F.No.:4-26(SB)/ CUJ/ Regr/ 2014/182-215 dated 25.09.2014 School of Knowledge Management Information and Media Studies / F.No.:4-26(SB) /CUJ/Regr/2014 /80-113 dated 25.09.2014 School of National Security Studies / F.No.:4-26(SB)/ CUJ/ Regr/ 2014/216-249 dated 25.09.2014

			School of Life Sciences: F.No.:4-26(SB)/ CUJ/ Regr/ 2014/113-146 dated 25.09.2014 School of Languages: F.No.:4-26(SB)/ CUJ/ Regr/ 2014/147-181 dated 25.09.2014 School of Business Studies: F.No.:4-26(SB)/ CUJ/ Regr/ 2014/45-79 dated 25.09.2014 School of Education: F.No.:4-26(SB)/ CUJ/ Regr/ 2014/129-161 dated 15.12.2014 School of Basic and Applied Sciences: F.No.:4-26(SB)/ CUJ/ Regr/ 2014/162-186 dated 15.12.2014
9.	Considered prescribing fee to be charged from students of third year of Integrated M.Sc. Computer Science-MCA programme.	Resolved that the fee as given in Annexure 'A' be recommended to the Executive Council for approval.	Matter was placed before the EC in its meeting held on 04/08/14 and the EC approved the same. Office Order No. 355 dated 09.10.2014 has been issued.
10.	Considered recommending fee to be charged from Part-time Ph.D. Scholars.	Resolved that the fee as given in Annexure 'B' be recommended to the Executive Council for approval. Further resolved that for the future the fee structure be re-visited to mention clearly the fee under separate heading i.e. (i) One-time at the time of admission, (ii) on Annual basis (iii) on Semester basis and (iv) Refundable fee, for all programmes of studies.	Matter was placed before the EC in its meeting held on 04/08/2014 and the EC approved the same. Office-Order No. 356 dated 09.10.2014 has been issued. Committee has been constituted to revisit the fee structure vide Notification F.No. 4-30/ Acad-EC/ CUJ/ Regr/ 2014/ 3495-3525 dated 01.08.14
11.	Considered confirmation of action taken by the Vice Chancellor, in anticipation of approval of the Competent Authority, in having authorised prescribing additional fee for the students of Master's Degree Programme in Social Work w.e.f. the Academic Session 2014-15.	Resolved that the action taken by the Vice Chancellor in having authorized prescribing additional fee of Rs. 3000/- (Rs. 1500/- for Field Work and Rs. 1500/- for Educational Tour) w.e.f. Academic Session 2014-15, be confirmed.	Matter was placed before the EC in its meeting held on 04/08/14 and the EC approved the same. Office-Order No. 359 dated 09.10.2014 has been issued.

12.	Considered the scheme and syllabi of Master's Degree Programmes for the subjects of National Security Studies, Public Policy and Public Administration, Mass Communication and New Media, Social Work and Education (M. Ed).	Resolved that the scheme and syllabi of Master's Degree Programmes for the subjects of National Security Studies, Public Policy and Public Administration, Mass Communication and New Media, Social Work and Education (M.Ed.) (as per Supplementary Agenda Annexure – IV, V, VI, VII, VIII), be approved.	Notification F.No. 4-29/ Acad-Syllabi/2014/2684-2711 dated 15.07.2014 has been issued.
13.	Considered the scheme and syllabi of Integrated M.Phil-Ph.D. Programmes for the subjects of National Security Studies, Public Policy and Public Administration, and Education.	Resolved that the scheme and syllabi of Integrated M.Phil.-Ph.D. Programmes for the subjects of National Security Studies, Public Policy and Public Administration and Education (as per Supplementary Agenda Annexure-IX, X, XI), be approved.	Notification F.No. 4-29/Acad-Syllabi/2014/ 2657-2683 dated 15.07.2014 has been issued.
14.	Considered introduction of Course No. MHRM 176-Entrepreneurship and Small Business Management, in MBA-HRM, semesters I, II, III and IV, as University Wide Elective course for students of Departments other than MBA (HRM) for Academic Session 2014-15.	Resolved that the introduction of Course No. MHRM 176-Entrepreneurship and Small Business Management, in MBA-HRM, semesters I, II, III and IV, as University wide Elective Course for students of Departments other than MBA (HRM) for Academic Session 2014-15 (as per Supplementary Agenda Annexure – XII), be approved.	Notification No. 4-29/Acad-Syllabi/2014/2736-62 dated 17.07.2014 has been issued.
15.	Considered continuation of syllabi of following Master's Degree Programmes and Integrated M.Phil.-Ph.D. programmes for the Academic Session as mentioned against each subject.	Resolved that continuation of syllabi of Master's Degree Programmes and Integrated M.Phil.-Ph.D. programmes for the Academic Session (as per Supplementary Agenda Annexure – XIII), be approved (with modification as shown in Annexure – C).	Notification No. 4-29/Acad-Syllabi/ CUJ/Regr/2014/ 2802-28 dated 21.07.2014 has been issued.
16.	Considered confirmation of action taken by the Vice Chancellor, in anticipation of approval of the Competent Authority, in having authorized introduction of Course No. MAMT-207 title Complex Analysis for Academic Session 2013-14 and continuation of the syllabi of Master's Degree Programme in Applied Mathematics, IInd semester for the Academic Session, 2014-15.	Resolved that the action taken by the Vice Chancellor, in having authorized introduction of Course No. MAMT-207 title Complex Analysis for Academic Session 2013-14, (as per Supplementary Agenda Annexure-XIV), be confirmed. Further resolved that continuation of syllabi of Master's Degree Programme in Applied Mathematics, IInd semester for the Academic Session 2014-15, be approved.	Notification F.No. 4-29/ Acad-Syllabi/CUJ/Regr/2014/2833-2860 dated 22.07.2014 has been issued.

Item No. 04

To consider confirmation of the action taken by the Vice Chancellor in having adopted Courses No. MAMT-311 and IMPMAT-105 in the Department of Mathematics in anticipation of approval of the Competent Authority.

In order to facilitate teaching for the students of M.Sc. Applied Mathematics and Integrated M.Phil.-Ph.D. programme and to introduce the concepts of Geometry of Curves and Surfaces in the course work, the Vice Chancellor authorised adoption of Course No. MAMT-311, "Differential Geometry" for M.Sc. Applied Mathematics semester-III, as an Elective Course and Course No. IMPMAT-105, "Differential Manifolds" for M.Phil. in the Integrated M.Phil.-Ph.D. programme for the Academic Session, 2014-15.

The syllabi and courses of study are annexed as **Annexure-01 (Page No. 24-26)**

S.No.	Course No.	Course Title
1.	MAMT-311	Differential Geometry
2.	IMPMAT-105	Differential Manifolds

The Academic Council may consider and confirm the action taken by the Vice Chancellor.

Item No. 05

To consider confirmation of the action taken by the Vice Chancellor in having approved syllabus of Integrated M.Sc. Computer Science-MCA programme for III, IV, V VI semesters in anticipation of approval of the Competent Authority.

In order to facilitate teaching in the courses started by the University, the Vice Chancellor, in anticipation of the approval of the Academic Council, had approved detailed course contents of the programmes of studies in respect of the courses mentioned below:

S.No.	Syllabus	Academic Session
1	3rd Semester	2014-15, 2015-16 & 2016-17
2	4th Semester	2014-15, 2015-16 & 2016-17
3	5th Semester	2015-16
4	6th Semester	2015-16 (Project)

The Academic Council may consider the same and confirm the action taken by the Vice Chancellor and also approve continuation of the syllabi for the coming Academic Sessions as per the details at **Annexure – 02 (Page No. 27-47)**

Item No. 06

To consider confirmation of action taken by the Vice Chancellor, in anticipation of approval of the Competent Authority, in having authorized the modification in the title of Course No: IMPHRM- 102, title: "Contemporary Issues in People Management", in place of title: "Contemporary Issues in Public Management" and its continuation for the Academic Session 2014-15.

The Academic Council in its meeting held on 25th Nov. 2013, resolved to approve the scheme and syllabi in respect of Integrated M.Phil.-Ph.D. programme in the Department of HRM, as Course No. IMPHRM-102, and that the title of paper be read as "Contemporary Issues in Public Management" in place of title "Contemporary Issues in People Management". However, later the Head, HRM & OB vide letter No. TAB/CUJ/MBA-HRM/9304 dated 26/05/2014 informed that the subject experts have opined that Public Management is not relevant in the discipline of HRM & OB **(Annexure – 03, Page No. 48–50)** The HOD, therefore, recommended that the Course No. IMPHRM 102, title: "Contemporary Issues in People Management" be continued.

Further, the HOD informed that the original title of the Paper was "Contemporary Issues in People Management" and the contents of the Paper have been prepared keeping in view the title as such. The Academic Council has resolved to change the title of the course only, without changing the contents. Therefore, the changed title of the paper is not compatible with contents unless they are changed. If the title is to be changed the contents are also required to be changed.

Keeping in view the above, the Vice Chancellor, authorised the modification in the title of Course No: IMPHRM-102, title: "Contemporary Issues in People Management", in place of title: "Contemporary Issues in Public Management" and its continuation for the Academic Session 2014-15, in anticipation of approval of the Competent Authority.

Therefore, the action taken by the Vice Chancellor is submitted to the Academic Council for confirmation.

Item No. 07

To consider action taken by the Vice Chancellor in having authorized fee and other charges payable by the students of the University, in anticipation of approval of the Competent Authority and further to prescribe fee for re-registration for Ph.D. programme.

University Ordinance No. 23 governing Fees and Other Charges payable by the students of the University reads as under:-

Clause 1 - Fees and other charges shall be as prescribed, from time to time, by Executive Council on the recommendations of the Academic Council.

Clause 2 - Fees and other charges payable by the applicants and students admitted to different Programmes of Studies shall be as specified in the Admission Brochure/Prospectus issued by the University from time to time.

The University has adopted fee structure as recommended by the Academic Council and approved by the Executive Council from time to time. However, in view of increased functions of the University, fee for some of the activities being undertaken has not been prescribed by the Executive Council.

Candidates of Master's Degree programmes whose results were declared in the category of Not Completed (NC) cases had to re-register in the subsequent session as provided in the Clauses 44 & 45 of Ordinance No. 4.

Similarly, candidates of Integrated M.Phil.-Ph.D. programmes who failed to submit the M.Phil. thesis in the time period prescribed for their submission had to re-register on payment of prescribed fee as provided by Clause 29 of Ordinance No. 6. The University proposed the charge of re-registration fee of Rs. 1000/- for each of the above mentioned categories for approval. The Vice Chancellor has approved the fee and other charges payable by the students/scholars as mentioned above, in anticipation of approval of the Competent Authorities.

Further, Clause 60 of Ordinance No. 6 provides that if a thesis is rejected by majority of the external examiners, the candidate shall have to re-register himself/herself in the next following session subject to the provisions of the Ordinance. It is proposed that fee of Rs. 1500/- may be prescribed to be charged from the scholars for re-registration in such cases.

The matter is submitted for consideration and recommendation to the Academic Council for ratification of action taken by the Vice Chancellor and prescribing proposed re-registration fee for Ph.D. programme.

Item No. 08

To consider starting of new Schools and Departments of Studies in the Central University of Jammu from the Academic Session 2015-16 and 2016-17.

The Central University of Jammu started functioning during Academic Session 2011-12 with introduction of three Masters Degree and M.Phil. Programme. Subsequently during the next three Academic Session more Departments have been added and the University has at present twelve Post-Graduate and eight Integrated M.Phil.-Ph.D. Programmes apart from Part-time Ph.D. Programmes for In-service Administrative and Academic personnel. The UGC vide letter No. F.40-1/2011 (CU) dated 3rd August, 2012 has sanctioned 140 faculty positions viz. 1 Professor, 2 Associate Professors and 4 Assistant Professors for every Department for total number of 20 Departments. As the XII Five-year plan is only upto 2017, eight more Departments with two new Schools proposed to be established.

Statute 15(1) of the Statutes of the University contained in the Second Schedule of the Central Universities Act 2009 provides that the University shall have such Schools of Studies as may be specified in the Statutes.

Clause 3 of the Draft Statute No. 40 as approved by the Executive Council provides that such School of Studies as may be decided by the Executive Council on the recommendation of the Academic Council, may be established in a phased manner. Clause 1 provides that the Central University of Jammu shall have the Schools of Studies as listed in Schedule – I of these Statutes.

Therefore, the Academic Council may consider and recommend to Executive Council the establishment of the following Schools of Studies:

Academic Session 2015-16

- School of Law

Academic Session 2016-17

- School of Visual and Performing Arts

Clause 3 of Ordinance No. 1 governing Department of Studies provides that "Such Departments as decided by the Executive Council, on the recommendation of the Academic Council, may be established in a phased manner". The Academic Council may also consider and recommend to the Executive Council establishment of the following Departments in the already existing Schools and two Schools to be established as stated above.

Academic Session 2015-16

- **School of Law**
  - Department of Law
- **School of Knowledge Managements, Information and Media Studies**
  - Department of Library and Information Science
- **School of Life Sciences**
  - Department of Plant Sciences
  - Department of Animal Sciences and Wildlife

Academic Session 2016-17

- **School of Humanities and Social Sciences**
  - Department of Political Science
- **School of Languages**
  - Department of Hindi and Other Indian Languages
- **School of Visual and Performing Arts**
  - Department of Music & Musicology
- **School of Basic and Applied Sciences**
  - Department of Physics & Astronomical Sciences

The Academic Council may consider and recommend to the Executive Council establishment of the above said two Schools and eight Departments of Studies in the Central University of Jammu from the Academic Session 2015-16 and 2016-17, as mentioned above.

Submitted for consideration and recommendation of the Academic Council to the Executive Council for approval.

Item No. 09

To consider starting of new Programmes of studies from the Academic Session 2015-16 and the scheme, syllabi and course thereof.

The University proposes to Department of Library and Information Science under School of Knowledge Managements, Information and Media Studies; Department of Plant Science; and Department of Animal Sciences and Wildlife under School of Life Sciences from Academic Session 2015-16. The proposal for the same forms part of the Agenda for the consideration of the Academic Council and recommendation of the same to the Executive Council vide **Item No. 08**.

The University proposes to start the following programmes of studies in the Departments to be started:-

S. No.	Department	Programme of Studies
1.	Department of Plant Sciences	Master's Degree Programme in Plant Sciences - **M.Sc. Botany**
2.	Department of Animal Sciences and Wildlife	Master's Degree Programme in Animal Sciences and Wildlife - **M.Sc. Zoology**
3.	Department of Library and Information Science	Master's Degree Programme in Library and Information Science - **MLIS**

The Steering Committees for the above programmes were constituted by the Vice Chancellor for preparing the schemes, syllabi and detailed course contents. The respective Steering Committees have prepared and recommended the scheme for aforesaid courses alongwith the syllabi and detailed course contents for the 1st and 2nd Semesters of each of the above said programmes.

The Academic Council may consider and approve starting of the above said programmes of studies alongwith the scheme for all semesters and syllabi and detailed course contents for the 1st and 2nd semesters of each programme as recommended by the respective Steering Committee.

The schemes, syllabi and detailed course contents of the following programmes are annexed as under:-

Programme	Annexure
Master Degree Programme in Plant Sciences - **M.Sc. Botany**	**04 (Page No. 51-86)**
Master Degree Programme in Animal Sciences and Wildlife - **M.Sc. Zoology**	**05 (Page No. 87-113)**

The Scheme, Syllabi & detailed course contents of Master's Degree Programme in MLIS will be placed on the table **(Annexure 06)**.

Item No. 10

To consider draft of degree formats for the Master's Degree & Research Degree Programmes run by the University.

Clause 32 of Ordinance No. 4 prescribes that Degree certificates to all the candidates who have passed the degree and post-degree examinations in various schools, signed by the Controller of Examinations and the Vice Chancellor, shall be awarded at the University Convocation in accordance with the provisions of the statutes and the Ordinances relating to convocation.

Further, Clauses 37 and 68 of Ordinance No. 6 provide for Award of M.Phil. and Ph.D. degree respectively to the candidates after completing the statutory requirement prescribed for the award of such degrees. The formats of the following degree certificates have been proposed by the University which have been recommended by the Deans' Committee. The following degree formats of respective programmes are placed before the Academic Council.

S.No.	Degree	Annexure
1.	Master of Arts (M.A.)	**07 (Page No. 114)**
2.	Master of Science (M.Sc.)	**08 (Page No. 115)**
3.	Master of Computer Applications (MCA)	**09 (Page No. 116)**
4.	Master of Business Administration (MBA) TTM HRM	 **10 (Page No. 117)** **11 (Page No. 118)**
5.	Master of Education (M.Ed.)	**12 (Page No. 119)**
6.	Master of Philosophy (M.Phil.)	**13 (Page No. 120)**
7.	Doctor of Philosophy (Ph.D.)	**14 (Page No. 121)**

Submitted for consideration and approval of Academic Council.

Item No. 11

To consider start of part-time Ph.D. programmes for in-service Academic and Administrative Personnel in the School of Business Studies and the School of Basic and Applied Sciences.

Clause 1 of Ordinance No. 6A provides that "there shall be a part-time Ph.D. programme leading to the Ph.D. degree for in-service academic and administrative personnel in the programmes of studies as determined by the Academic Council on the recommendations of the concerned School Board".

In pursuance to the meeting of Deans of the University held on 11th September, 2014, the Dean, School of Business Studies has recommended the start of part-time Ph.D. programmes for in-service Academic and Administrative Personnel in the Human Resource Management and the Tourism and Travel Management from the Academic Session 2015-16.

Further, the Dean, School of Basic and Applied Sciences has recommended the start of part-time Ph.D. programmes for in-service Academic and Administrative Personnel in Computer Science and Information Technology from the Academic Session 2015-16. The University is already running part-time Ph.D. programmes for Academic and Administrative Personnel in the Department of National Security Studies and Public Policy & Public Administration from the Academic Session 2014-15. Recommendations of the Dean, School of Business Studies and the Dean, School of Basic and Applied Sciences are at **Annexure – 15 (Page No. 122-123) & Annexure – 16 (Page No. 124)** respectively.

Submitted to the Academic Council for consideration and approval.

Item No. 12

To consider starting of Integrated M.Phil. - Ph.D. programmes in the School of Life Sciences and the School of Basic and Applied Sciences.

Clause 1 of Ordinance No. 6 provides that "there shall be Integrated M.Phil. – Ph.D. programmes in the University viz. Schools, Departments and Centres as determined by the Academic Council of the University from time to time".

The Dean School of Life Sciences and the Dean School of Basic and Applied Sciences have respectively recommended starting of Integrated M.Phil.–Ph.D. programmes for the Department of Environmental Sciences and the Department of Computer Science and Information Technology from the Academic Session 2015-16.

Recommendations of the respective Deans are annexed as **Annexure – 17 (Page No. 125) & Annexure – 18 (Page No. 126)** respectively.

Submitted to the Academic Council for consideration and approval.

Annexure - 01

Central University of Jammu

8/8, Trikuta Nagar, Jammu

F.No:4-2(Math)/CUJ/Regr/2014/4735-4748
Dated: 4 - 09 - 2014

Notification

It is hereby notified for the information of all concerned that, on the recommendations of the Board of Studies in Mathematics, the Vice- Chancellor, in anticipation of the approval of the competent authority, has been pleased to authorise the adoption of C.No MAMT-311, "Differential Geometry" for M.Sc. Applied Mathematics semester-III, as an Elective Course and C.No IMPMAT-105, "Differential Manifolds" for M.Phil in the Integrated M.Phil-Ph.D programme for the Academic session, 2014-15.

Registrar
4/9/14

Copy to
1. All HODs':

1. Mathematics 2. English 3. Economics
4. HRM 5. TTM 6. EVS 7. Education
8. Mass Communication and New Media
9. PPPA 10. Sociology and Social work
11.NSS 12.Computer Science & IT.

They are requested to send all such proposals well in advance and for some specific period instead of Piece-Meal approach, so that these may be put up to Academic Council as consideration Item; rather than Action taken report.

2. Controller of Examination
3. AR (Examinations).
4. Office Copy

Course Title: Differential Geometry
Duration of Examination: 3 hours

Course Code: MAMT- 311
Maximum Marks: 100

Objective: The aim of this course is to introduce geometry of curves and surfaces in $\mathbb{R}^3$.

Prerequisite: The prerequisite for this course is the basics of Linear Algebra and Analysis.

Unit-1

- Curves, Regular curves, Arch length and curves parameterized by arc length, Unit tangent vector, Tangent line and normal plane, Curvature, Principal normal unit vector, Principal normal line and osculating plane.

Unit-2

- Binormal, Moving tri-hedrons, Binormal line and rectifying plane, Torsion, Frenet equations, Intrinsic equations, Involutes, Evolutes, Fundamental existence theorem for space curves.

Unit-3

- Regular parametric representation of surface, Co-ordinate patches, Tangent plane and surface normal, First fundamental form, Arc length and surface area, Gauss map and second fundamental form, Normal curvature, Principal curvatures and directions,

Unit-4

- Gaussian and mean curvature, Lines of curvature, Rodrigue's formula, Asymptotic lines, Conjugate family of the curves, Gauss Weingarten equations, Compatibility equations and theorem of Gauss, Fundamental theorem of surfaces.

Unit-5

- 1-Forms, Tensors and Forms of higher rank, Tensor product, Inner product, Line element of Minkowski space, Wedge Products and n-Forms, Exterior derivatives, The Hodge-$\star$ operator, gradient, curl, divergence of differential Forms.

Text books:

- John McCleary, Geometry from a Differentiable Viewpoint, Cambridge University Press, USA, edition 1997. (for Unit-I, II, III, IV)
- Yves Talpaert, Differential Geometry with applications to Mechanics and Physics, Marcel Dekker Inc., New York, 2001. (for Unit-V)

Reference books:

- C.E. Weatherburn, Differential Geometry of Three Dimensions, Cambridge University Press, USA.
- Martin Lipschultz, Differential Geometry, Schaum's outlines, Tata McGraw-Hill edition 2005.
- Differential Geometry, A First Course, D. Somasundaram, Narosa Publishing House, Second Reprint 2008.
- Barrett O'Neill, Elementary Differential Geometry, Academic Press, USA, Revised Second Edition, 2006.
- M.P. Do Carmo, Differential Geometry of Curves and Surfaces, Prentice-Hall Inc., Englewood Cliffs, New Jersey.

HOD
Deptt of Mathematics
Central University of Jammu

Course Title: Differentiable Manifolds **Course Code: IMPMAT-105**
Course Credits: 5 **Duration of Examination: 3 Hours**
Maximum Marks: 100

Objective: The aim of this course is to introduce the concepts of Differentiable Manifolds, Riemannian Geometry.

Prerequisite: The prerequisite for this course is the basics of Differential Geometry, Linear Algebra, Topology and Analysis.

Unit 1

Chart and local co-ordinates, Atlas, Topological and differentiable manifold with examples, transition functions, product manifolds, vector field and tangent space, Lie brackets, differential map, pull-back of function, Jacobians, immersions and imbeddings.

Unit 2

Differential forms: 1-form and n-form, closed form, exact form, field of co-vectors, cotangent space, pull-back of differential forms, pull-back properties, geodesic and parallel transportation, covariant derivative and its interpretation, Christofell symbols of first and second kind.

Unit 3

Levi-Civita connections, torsions and symmetry, Riemannian metrics and Riemannian connections, induced metric, applications of Riemannian metrics to find length of curves, area, volume.

Unit 4

Riemannian curvature, sectional curvature, Ricci curvature, scalar curvature, connection forms, structural equations, curvature forms, exterior differential and pull-back and examples in R^3, Lie derivative of vector field, Lie derivative of Form and its interpretation.

Unit 5

Gradient, curl, divergence, Hodge operator, Laplacian, Hessian on manifolds, interior product, orientations and volume element, integration in R^n and its generalisation to manifolds, n-form integration on n-manifolds, Stoke's theorem for closed form.

Text book:

(i) M. P. Do Carmo, Riemannian Geometry, Birkhauser Boston.

Reference books:

(ii) Nirmala Prakash, Differential Geometry, TMH publishing

(iii) Theodore Frankel, The Geometry of Physics, Cambridge University press

(iv) K. Yano & M. Kon, Structure on manifolds, Ser. Pure Math., World Scientific, Singapore, 1984.

HOD
Deptt of Mathematics
Central University of Jammu

Annexure - 02

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Central University of Jammu

8/8, Trikuta Nagar, Jammu

Notification

It is hereby notified for the information of all concerned that on the recommendation of the Board of Studies in Computer Science & IT, the Vice-Chancellor, in anticipation approval of the competent authority, has been pleased to authorise the adoption of the syllabi and courses of study of Integrated M.Sc. Computer Science – MCA course to be applicable for the session, as given below;

S.No	Syllabus	To be applicable for the session
1.	3rd Semester	2014-15, 2015-16 & 2016-17
2.	4th Semester	2014-15, 2015-16 & 2016-17
3.	5th Semester	2015-16
4.	6th Semester	2015-16 (Project)

Further, the syllabi of 1st and 2nd semester of Integrated M.Sc. –MCA programme as approved for session 2013-14 and continued for the session 2014-15 vide notification F.No 4-29/Acad-Syllabi/CUJ/Regr/2014/2802-28 dated 21-7-2014, be also continued for the session 2015-16.

Registrar

29/8/14

F.No: 4-7/MCA/CUJ/Regr/2013/ 4437 – 4452

Dated: 29-08-2014

Copy to:

1. I/c Computer Science & IT
2. All HODs'
3. Staff Officer to V.C.
4. Controller of Examination
5. Academic Coordinator
6. AR (Exam)
7. Office Copy

CENTRAL UNIVERSITY OF JAMMU
FOR EXAMINATION TO BE HELD FROM DECEMBER 2014
M.Sc. (Computer Science)-MCA Third Semester

Scheme of Syllabus

Course No.	Title	Credits	Total Marks
MCSA301	Analysis & Design of Algorithms	4	100
MCSA302	Internet & Java Programming	4	100
MCSA303	Theory of Computation	4	100
MCSA304	Software Engineering	4	100
MCSA350	Laboratory- Practical's based on MCSA301 & MCSA302	8	200
	Elective course offered by other Departments	4	100
	Total	**28**	**700**

Head,
Department of Computer Science
Central University of Jammu,
Jammu

Integrated M.Sc. (Computer Science)-MCA Third Semester

Course title: Analysis and Design of Algorithms **COURSE No. MCSA-301**
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

UNIT -I

Introduction to Algorithms, Analyzing the Performance of an Algorithm, Space /Time complexity, Asymptotic Notation, Recurrence Relations, Performance measurement. Review of elementary data structures.

UNIT-II

Divide and Conquer:- General methods, Binary Search, Finding the Maximum & Minimum, Merge sort, Quick Sort & Selection sort, Stassen's Matrix, Multiplication
Greedy Method :- General Methods, Optimal Storage on Tapes, Job Sequencing with Deadlines, Optimal Merge Patterns, Single Source, shortest path.

UNIT-III

Dynamic Programming: - General Methods, Multistage Graphs, I/O Knapsack, Reliability Design, Traveling Salesperson problem.
Back Tracking: - General Method, The 8- Queens Problem, Hamiltonian Cycles, Knapsack Problem.
Branch & Bound: - The method, I/O Knapsack Problem, Traveling Salesperson Problem.

UNIT-IV

Graph Algorithms: Review of graph algorithms, topological sort, strongly connected components, minimum spanning trees- Kruskal and Prims, Single source shortest paths, relaxation, Dijkstras algorithm, Bellman- Ford algorithm, Single source shortest paths for directed acyclic graphs, difference constraints and shortest paths, All pairs shortest paths- shortest paths and matrix multiplication, Floyd-Warshall algorithm, Johnsons algorithm.

UNIT-V

Lower Bound Theory: - Comparison Trees For searching & Sorting, Parallel Comparison trees, Lower Bounds through Reduction, Concept of Heap and Hashing.
NP-Hard and NP- Complete Problems: Basic concepts, Non-Deterministic Algorithms, Polynomial Time Algorithms, and NP-hard & NP –complete classes, Look's Theorem, Introduction to Approximation Algorithms.

REFERENCE BOOKS:

1. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni.
2. Data Structure & Algorithm by J.M. Hopcraft , Ullman
3. Introduction To Algorithms, Thomas H Cormen, Charles E Leiserson And Ronald L Rivest: 1990, TMH

Integrated M.Sc. (Computer Science)-MCA Third Semester

COURSE TITLE: INTERNET & JAVA PROGRAMMING **COURSE No.:** MCSA-302
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

Unit-1

Introduction: Internet, Internet communication media, Internet service providers, Internet services, E-Mail concepts, Video Conferencing set up, web servers, mail server, proxy server, Web browsers, search engines, cookies.

Unit- II

Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, String handling, Networking.

Unit-III

Java Applet, creating simple applet program, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

Unit-IV

Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.

Unit-V

JDBC: The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database.

Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, **Introduction to RMI (Remote Method Invocation):** A simple client-server application using RMI.

REFERENCE BOOKS:

1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH
3. Balagurusamy E, "Programming in JAVA", TMH
4. Dustin R. Callway, "Inside Servlets", Addison Wesley
5. Mark Wutica, "Java Enterprise Edition", QUE
6. Steven Holzner, "Java2 Black book", dreamtech

Integrated M.Sc. (Computer Science)-MCA Third Semester

COURSE TITLE: Theory of Computation **COURSE No.:** MCSA-303
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

UNIT I

Introduction:-Basic concepts of strings, Symbols, string Concatenation, alphabet, Language, Tree, States, Transition Tables, Sets, Relations, Finite Automata, Regular Expressions, Compilers and translators, structure of a compiler.

UNIT II

Finite State Systems: - Deterministic Finite Automata (DFA) and Non- deterministic finite Automata (NFA),Equivalence of the DFA and NFA,Converting NDFA to equivalent DFA,Minimization of DFA,Finite Automata with Output(Moore and mealy machines), Transformation of a Mealy Machine into a Moore Machine, FSM properties and limitations.

UNIT III

Regular Expressions: - Regular expression designing, Equivalence of finite Automata and Regular Expressions, Algebraic method using Arden's theorem Conversion of NFA with ε moves into an equivalent NFA without ε-moves, Construction of FA equivalent to a regular expression, Pumping lemma of regular sets, Closure properties of regular sets, Comparison of automata models, application of regular expressions and Finite automata.

UNIT IV

Context free Grammars, Derivation Tree(Left and right Derivation), Ambiguous Grammar(Removal of Ambiguity in the CFGs), Grammar Simplifications: Reduced Grammar, Removal of ε productions from a Grammar, Nullable Symbols, Removing Unit Productions, Applications of Context- free Grammar

Normal Forms: Chomsky Normal Form, Greibach Normal Form, Chomsky Hierarchy, Regular Grammars and FA.

Unit V

Pushdown Automata (PDA), Non-Deterministic PDA,Context-Free Grammars and Push-down Automata, Construction of a PDA from the Context-Free Grammar, Properties of Context-Free Languages,PDA with two Stacks.

Turing Machines: Turing Machine Model, Representation ,Non- deterministic Turing Machines, Recursive and Recursively Enumerable languages, Turing Machine Limitations(Unsolvability),Church"s Hypothesis, Universal Turing machines, decidability, Halting problem.

REFERENCE BOOKS:

1. H. R. Lewis and C. H. Papadimitriou - Elements of the Theory of Computation, Prentice Hall.
2. J. E. Hopcroft, R. Motwani and J. D Ullman - Introduction to Automata Theory, Languages and Computation, Pearson Education Asia.
3. J. E. Hopcroft, and J. D Ullman - Introduction to Automata Theory, Languages and Computation, Addison Wesley.
4. J.C. Martin – Introduction to Languages and Theory of Computation, Tata Mcgraw Hill.
5. E. V. Krishna moorthy, "Introductory theory of Computer Science". East West Press Pvt. Ltd., New Delhi.
6. K. L. P. Mishra and N. Chandrasekaran - "Theory of Computations (Automata, languages and Computation)", Prentice Hall .
7. Rogers H., Theory of Recursive Functions and effective computing, Mcgraw- Hill.

Integrated M.Sc. (Computer Science)-MCA Third Semester

COURSE TITLE: Software Engineering **COURSE No.:** MCSA-304
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

UNIT – I

Software Engineering: Evolving Role of Software, Software Engineering challenges& approach, Changing nature of Software, Software Myths, Role of management in software development, Software Process and desired Characteristics.

Software Life Cycle Models: Water Fall Model, Incremental Process Models: iterative model, RAD model; Evolutionary Process Models: prototyping, spiral, Unified Process. Comparison of DLC Models, Other Software Processes, Selection of a Model.

UNIT – II

Software Requirements Analysis & Specifications: Software requirements & specifications, problem analysis, validation, metrics.

Software Architecture: Role of software architecture, Architecture views,data design: architectural level & component level, Component & Connector View ,architecture styles for C&C, Architecture issues ,Evaluating Architectures.

Software Project Planning: Project planning process: scope, resources, size estimation, cost estimation techniques: empirical, heuristic,analytical ,quality plan, Software Risk Management

UNIT – III

Software Design: Design phases and approaches to software design;,Function Oriented Design: Design principles, Module level Concepts, Notation & Specification, Structured Design Methodology, Verification. Object-Oriented Design: OO Analysis & Design, OO Concepts, Design Concepts, UML – Class Diagram, Sequence & Collaboration Diagram, Other diagrams & Capabilities, Design Methodology , Dynamic and Functional Modeling.

UNIT – IV

Detailed Design: PDL, Logic/Algorithm Design, State Modeling of Classes, Verification: Design Walkthroughs, Critical Design Review, Consistency Checkers.

Coding: Programming Principles & Guidelines, Coding Process, Refactoring, Verification.

UNIT – V

Software Testing: Testing fundamentals , unit testing, black box testing, white box testing, strategy for conventional software architecture, O-O architecture, validation testing ,system testing, defect analysis & debugging.

Software Maintenance & Certification: Software Maintenance types, characteristics, Process models, Estimation of Maintenance Costs, ISO Certification concept, software Reverse Engineering.

REFERENCE BOOKS:

1. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3rd Edition, Narosa Publishing House, 2005
2. K.K. Aggrawal and Yogesh Singh, "Software Engineering", 3rd Edition, New Age International (P) Ltd, 2008.
3. Pressman, R S., "Software Engineering – A Practitioner's Approach", 6th Edition, McGraw Hills, 2010.
4. Mall Rajib, "Fundamentals of Software Engineering", PHI, New Delhi, 2011.
5. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hills.

CENTRAL UNIVERSITY OF JAMMU
FOR EXAMINATION TO BE HELD FROM MAY 2015
Integrated M.Sc. (Computer Science)-MCA Fourth Semester
Scheme of Syllabus

Course No.	Title	Credits	Total Marks
MCSA401	Advance Technology(.NET Programming)	4	100
MCSA402	Computer Graphics	4	100
MCSA403	Artificial Intelligence	4	100
	Elective-I	4	100
MCSA450	Minor Project	8	200
	Elective course offered by other Departments	4	100
	Total	**28**	**700**

Elective-I	
MCSA411	Probability and Statistics
MCSA412	Numerical Computing
MCSA413	Microprocessors
MCSA414	Computer Based Optimization Techniques
MCSA415	Compiler Design
MCSA416	Information Systems

Head,
Department of Computer Science
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Jammu

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Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Advance Technology (.NET Programming) **COURSE No.:** MCSA-401
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

Unit-1

The .Net framework: Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Time Compilation, Framework Base Classes.

Unit-II

C -Sharp programming (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Objects, Classes, Inheritance, Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type conversion.

Unit-IIi

C# Using Libraries: Namespace System, Input-Output functions, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.

Unit-IV

Advanced Features Using C#: Web Services, Window Services, ASP.Net Web Form Controls, ADO.Net. Distributed Application in C#, Unsafe Mode, Graphical Device interface with C#.

Unit-V

.Net Assemblies and Attributes: .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute.

REFERENCE BOOKS:

1. Wiley," Beginning Visual C# 2008",Wrox
2. Fergal Grimes," Microsoft .Net for Programmers". (SPI)
3. Balagurusamy," Programming with C#", (TMH)
4. Mark Michaelis, "Essential C# 3.0: For .NET Framework 3.5, 2/e, Pearson Education
5. Shibi Parikkar, " C# with .Net Frame Work" , Firewall Media.

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Computer Graphics **COURSE No.:** MCSA-402
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

UNIT –I

Introduction to Computer Graphics: Basics of Computer Graphics, Applications of computer graphics, Bitmap and Vector- Based Graphics, Random and Raster scan systems, Graphics input and output devices, Graphics software and standards, color models.

UNIT-II

Concept of Graphic Primitives: Coordinate system overview, points, lines, circles and ellipses as primitives. Line generation algorithms (DDA and Bresenhams),Circle and its properties, generation of circle (Bresenham"s Method , midpoint algorithms), Point and Line clipping((cohen-sutherland, Liang-Barsky algorithms).

UNIT-III

Two-Dimensional transformations: Basic Transformations-Translation, Rotation, Scaling, Reflection, Shear Transformations, Combined Transformation, rotation about an Arbitrary point, inverse transformations

Three-dimensional transformations: Translation, rotation, scaling, rotation about an Arbitrary axis, reflection

UNIT-IV

Viewing Transformations: Introduction, objectives of viewing transformation. World Coordinates and Viewing Coordinates. Concept of projections: parallel projection, orthographic and oblique projections, isometric projections, perspective projections-concept of vanishing points, single point, perspective transformation, window-to-viewport transformations.

UNIT-V

Introduction to polygons and curves: Polygon representation methods -polygon surfaces, polygon tables, plain equation, polygon meshes. Hermite and Bezier curves and their properties. B-Spline Curves, Fractals and its applications.

Concept of visible surface detection. Methods of visible surface detection (depth buffer, scan line, area sub division)

REFERENCE BOOKS:

1. Hearn, D., Baker, and P.M.: Computer Graphics, Prentice-Hall.
2. A.P Godse "Computer Graphics", Technical Publication.
3. Rogers, D.F.: Procedural Elements for Computer Graphics, McGraw-Hill, 1985.
4. Harrington, S.: Computer Graphics: A Programming Approach, TataMcGraw- Hill, 1983.
5. Foley, J.D., Van Dam, A.: Fundamentals of Interactive Computer Graphics, Addison Wesley, 1982.
6. Zhingang Xiang,Roy Plastock,Computer Graphics,Schaum"s Outlines
7. Tosijasu, L.K.: Computer Graphics, Springer Verlog, 1983.
8. Rogers, D.F. McGraw Hill: Mathematical Elements of Computer Graphics,
9. Newman, W., Sproul, R.F.: Principles of Interactive Computer Graphics, McGraw-Hill, 1980.
10. Computer Graphics C Version, D.Hearn And P.Baker, Pearson Education

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Artificial Intelligence **COURSE No.:** MCSA-403
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

Unit-I

Scope of AI: Games, theorem proving, Natural Language Processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.
Problem solving: State space search; Production system, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, A* search, AO search,

branch and bound. Alpha beta pruning, Problem Reduction, Constraint Satisfaction, Means-End Analysis

Unit-II

Knowledge Representation: Predicate Logic: Unification, modus pones, resolution, dependency directed backtracking. Rule based Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtracks.

Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.

Unit-III

UNCERTAINTY: Non-monotonic reasoning, Logics Implementation, Probability and Bayes theorem- Certainty factors ,Bayesian networks, Dempster- Shafer theory

Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, Neural networks.

Unit-IV

Natural Language Processing: Definition, Phases Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing. Applications of Natural Language Processing.

Unit-V

Expert Systems: Features, Characteristics-Architecture-Basic Activities-Stages in development, Structure of a knowledge base, Probability based Expert Systems – Tools, Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI. Introduction to PROLOG

REFERENCE BOOKS:

1.E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2.N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.

Reference books :

1.D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2.Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
3.R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
4.M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994.

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Probability and statistics **COURSE No.:** MCSA-411
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS
Lectures: 4 hours per week

UNIT-I Probability Theory

Concept of Probability, Random experiment: Sample spaces; classical probability and frequency, subjective probability. probability of an event, conditional probability, mutually exclusive events; Random variable; classification of random variables; mean and variance of discrete random variable; mathematical expectations; variance and standard deviation; mode and median, moments of random variable, moment generating functions.

UNIT-II: Probability distributions

Discrete Probability Distributions: Binomial (Derivation, mean and variance and fitting of Binomial distribution), Poisson (Poisson as a limiting case of Binomial distribution, mean and variance and fitting of Poisson distribution).

Continuous Probability Distributions: Standard variables and normal distribution, mean and variance of normal distribution, computing normal probabilities, fitting of normal distribution in a given set of data, Student's T test and F-Static test.

UNIT-III. Basic Statistics

Basic Statistics: Measures of central tendencies:- Mean, Median, Mode; Measures of dispersion: Range variance and standard deviation; Frequency distribution and cumulative frequency distributions;

Linear correlation coefficient; Linear regression; Non-linear regression; Multiple correlation and multiple-regression;

UNIT-IV: Sampling Theory

Concept of Population, Sample, Importance of Sampling and its advantages, Sampling distributions, mean and standard deviation of the sampling distribution of means, Sampling distribution of proportions, mean and standard deviation of Sampling distribution of proportions, Sample Variance, Sampling distribution of variances

Estimating mean and variance: Estimator, Estimate, Estimation, interval estimation of population mean, interval, level of confidence, estimating population mean.

UNIT-V : Hypothesis Testing and Decision-making

Statistical decisions, hypothesis testing, type-1 and type-2 errors, level of significance, one tailed and tailed tests.

One sample hypothesis tests: Hypothesis tests of means - two tailed and one tailed.

Two sample hypothesis tests: Sampling distribution of the differences between sample means, two tailed and one tailed tests, two sample hypothesis test of percentages.

Chi-square analysis: Chi-square distribution, Chi-square testing, Computation of expected frequencies, testing of goodness of fit.

REFERENCE BOOKS:

1. AFFI, A.A.: Statistcal Analysis: A Computer Oriented Approach, Academic Press, Inc. 1979.
2. MORRIS, C., ROLPH, J.: Introduction to Data Analysis and Statistical Inference,Prentice-Hall, 1981.
3. SCALZO, F.: Elementary Computer Assited Statistics, Van Nostrand Reinherd Co. Ltd., 1978.
4. JOHNSTON, J.: Econometric Methods, McGraw-Hill.
5. HOGG, R.V., CRAIG, A.L.: Introduction to Mathematical Statistics, American Publishing Co. Pvt. Ltd.
6. YULE, U.G., KENDALL, M.G.: An Introduction to the Theory of Statistics, Charles Griffinand Co. Ltd.
7. DRAPER, N.A., SMITH, H.: Applied Regresion Analysis John-Wiley and Sons, Inc.
8. ANDERSON, T.W.: An Introduction to Multivariate Statistical Analysis, John-WileyandSons, Inc.
9. MORRISON, D.F.: Multivariate Statistical Methods, McGraw-Hill.

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Numerical Computing **COURSE No.:** MCSA-412
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

Unit-I

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

Unit-II

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidel iterative method, Rate of Convergence.

Unit-III

Interpolation and approximation: Finite Differences, Difference tables Polynomial Interpolation: Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula. Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation Approximation of function by Taylor's series and Chebyshev polynomial

Unit-IV

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Boole's Rule, Weddle's Rule Euler- Maclaurin Formula Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods

Unit-V

Curve fitting, Cubic Spline and Approximation: Method of least squares, fitting of straight lines, polynomials, exponential curves etc Frequency Chart: Different frequency chart like Histogram, Frequency curve, Pi-chart. Regression analysis: Linear and Non-linear regression, Multiple regression

REFERENCE BOOKS:

1. Rajaraman V., "Computer Oriented Numerical Methods", PHI
2. Gerald & Wheatley, "Applied Numerical Analyses", AW
3. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int
4. Grewal B. S., "Numerical methods in Engineering and Science", Khanna Publishers, Delhi
5. T. Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods", TMH
6. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
7. Francis Scheld, "Numerical Analysis", TMH

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Microprocessors **COURSE No.:** MCSA413
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures:** 4 hours per week

Unit I

Introduction to microprocessors, overview of Microcomputer Structure and operation. Memory: Basic memory cell, 2D/3D Static RAM, Static and Dynamic Memory, Types of ROM, associative memory and interleaved memory, Random access, Sequential access, Direct access, virtual memory, Introduction to hardware, software and firmware,

Unit II

Microprocessor Architecture and its operations (8085), introduction to: address bus, data bus, control bus, memory map and Addresses, Input and Output devices: Peripheral-Mapped I/O and Memory-Mapped I/O, Pin Description of 8085, applications of microprocessors

Unit III

Introduction to 8085 Instructions: Instruction Set and Instruction Format, Data Transfer Instructions, Arithmetic Operations, Logic and Branch Operations, Programming Techniques with Additional Instructions, Looping, Counting and Indexing, Logic Operations, Rotate Compare.

Unit IV

Counters and Time Delay Programs, Stack and Subroutines, Conditional Call and Return Instructions & Code Conversions, BCD to Binary, Binary to BCD, BCD to Seven Segment L.E.D, ASCII to Binary, BCD Addition, BCD Subtraction, Introduction to Advanced Instructions and Applications, Multiplication, Subtraction with carry.

Unit V

Parallel Input/Output & Interfacing: - Basic Interfacing Concepts, Interfacing Output Displays, Interfacing Input Keyboards, Memory Mapped I/O, Interfacing Memory.
Programmable Interface Devices: - Basics of Programmable I/O, General Purpose Programmable Peripheral Devices – 8255A, 8259A, Direct Memory Access Controller – 8237, 8279, 8253, 8155.

REFERENCE BOOKS:

1. Microprocessor Architecture, Programming and Applications with 8085/8080 - Ramesh S. Gaonkar.
2. Introduction to Microprocessors - Aditya Mathur
3. Programming & Design - LIU & Gibson
4. Microprocessor & Interfacing - Douglas V. Hall

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Computer Based Optimization Techniques **COURSE No.:** MCSC-414
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

UNIT-I

Overview: Introduction to Operation Research, techniques, tools, phases, limitations and applications in OR.

Linear programming-I: (Graphical method) Introduction, Formulation of a linear programming problem with different types of constraints, requirements, assumptions, merits and demerits, applications of LP, Graphical analysis, Graphical solution, Multiple, unbounded solution and infeasible problems and its applications

Linear programming-II: (Simplex method (SM)) Introduction, SM with several decision variables. Two phase simplex method, M-method, multiple, unbounded solution, infeasible problems, Sensitivity and duality analysis in LP, Dual Simplex Problems.

UNIT-II

Transportation Problem (TP): Structure and formulation of TP, Procedure for TP, Methods for finding initial feasible and optimal solution, Unbalanced TP, maximization TP, degeneracy problems in TP.

Assignment Problem (AP): Approach, procedure and maximization, unbalanced assignment problems,Hungarian Method.

Project Scheduling: Network analysis concept, CPM/PERT methods for scheduling of projects.

UNIT-III

Sequencing problems: Processing n-jobs through two, three, M machines, Processing of n-jobs through M machines.

Replacement decisions: Replacement of items that deteriorate with time (with and without change in money value), Staff replacement problem.

UNIT-IV

Integer and dynamic programming: Integer programming, formulation techniques, unimodularity, cutting plane method, branch and bound method.

UNIT-V

Dynamic programming: Methodology and its programming applications.

Game Theory:Basic terminology, solution methods of pure and mixed strategy games, principle of dominance, limitations.

REFERENCE BOOKS:

1. V K KAPOOR, Operations Research, Techniques for Management, Edition 7, Publishers: Sultan Chand and sons, 2004.
2. S S Rao optimization theory and applications, Wiley Eastern Ltd., New Delhi.
3. S.D.Sharma: Operations research, Kedar nath, Ram Nath & co.
4. H.A.Taha, Operations Research-An introduction, Macmillan Publishing co.inc.New york

5. Kanti Swarup, P K Gupta and Man Mohan, Operations Research, Sultan chand and sons, New Delhi.
6. Prem Kumar Gupta and D.S, Hira, Operations Research-An introduction, S.Chand and Company Ltd, New Delhi.

Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: Complier Design **COURSE No.:** MCSA-415
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

Unit – I

Overview of language processing – pre-processors – compiler – assembler – interpreters – linkers & loaders - structure of a compiler -- phases of a compiler.

Lexical Analysis – Role of Lexical Analysis – Lexical Analysis Vs. Parsing – Token, patterns and Lexemes – Lexical Errors – Regular Expressions – Regular definitions for the language constructs – Strings, Sequences, Comments – Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.

Unit – II

Syntax Analysis – Role of a parser – classification of parsing techniques – Top down parsing – First and Follow- LL(1) Grammars, Non-Recursive predictive parsing – Error recovery in predictive parsing.

Introduction to simple LR – Why LR Parsers – Model of an LR Parsers – Operator Precedence- Shift Reduce Parsing – Difference between LR and LL Parsers, Construction of SLR Tables. More powerful LR parses, construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity, Error recovery in LR Parsing.

Unit – III

Semantic analysis, SDT, evaluation of semantic rules, symbol tables, use of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms.

Unit – IV

Intermediate code , three address code, quadruples, triples, abstract syntax trees, basic blocks, CFG.

Unit – V

Machine independent code optimization - Common sub expression elimination, constant folding, copy propagation, dead code elimination, strength reduction, loop optimization, Machine dependent code optimization: Peephole optimization, register allocation, instruction scheduling, inter procedural optimization, garbage collection via reference counting.

REFERENCE BOOKS:

1. Compilers, Principles Techniques and Tools- Alfred V Aho, Monical S Lam, Ravi Sethi, Jeffrey D. Ullman,2nd ed, Pearson,2007.
2. C.N. Fisher and R.J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003.
3. Principles of compiler design, 2nd ed, Nandini Prasad, Elsevier
4. Compiler construction, Principles and Practice, Kenneth C Louden, CENGAGE
5. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw – Hill, 2003

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Integrated M.Sc. (Computer Science)-MCA Fourth Semester

COURSE TITLE: INFORMATION SYSTEMS **COURSE No.:** MCSA416
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

UNIT- I

Introduction: Definition, Data v/s Information, Types of Information -Strategic Information, Tactical Information, Operational Information; Information Quality, Dimensions of Information -Economic Dimension, Business Dimension, Technical Dimension; System Definition , types of Systems -Abstract and Physical Systems, Deterministic and Probabilistic Systems, Open and Closed Systems, User-Machine Systems; System Related Concepts - Boundary, Interface and Black Box, System Decomposition, Integration of Sub-Systems, Elements of a System.

UNIT -II

Information Systems Components: Data, Hardware, Software, Telecommunications, Data Processing concepts-Distributed Processing, Centralized Data Processing, Decentralized Data Processing, Distributed Databases, Client Server Computing, Internet, Intranet, Electronic Conferencing.

Factors affecting the value of information in organization- Completeness, Accuracy, Correctness, Timeliness etc. The Information Processing Cycle: Acquisition, Input, Validation, Processing, Storage, Retrieval, Output, Communication and Disposal.

UNIT -III

Types of information systems: Transaction processing system and its types, Office automation system (OAS) and its types, Management information system (MIS),Executive information system (EIS),Decision support system (DSS), Understanding Ethics of Information Systems , Information Privacy, Accuracy, Property and Accessibility.

Future of IS in an Organization, Business Process Reengineering

UNIT- IV

Information Systems Security and Control: Introduction to Information Security, Authentication, Authorization, Threats, Attacks, types of attacks, Intrusion Detection, Password Management, Malicious Softwares, Protection. Firewalls: Types and Design Principles.

UNIT- V

Support Systems For Management Decisions: Database Resource Management, Data Ware Housing- Overview And Concepts, Need for data warehousing, data marts, OLTP,OLAP and types, Data Mining, Intelligent Support Systems.

REFERENCE BOOKS:

1. Raja Raman. V. "System analysis and design "prentice-hall
2. Murdic, R.G. ROSE, J.E. & Claggt, J.R. "information systems for modern management "Prentice-Hall India.
3. Awadh, "System analysis and design"
4. Kenneth C. Laudon, "Management Information systems :Organization and Technology",6th Edition
5. Marakas, G.M. "Decision Support Systems in the 21st Century". Prentice Hall, Upper Saddle River, NJ, 2003.
6. Jaiswal S, "Management Information Systems"
7. O Brien, "Management Information Systems", Tata Mc Graw Hill
8. Effyoz, "Management Information System"Cengage Learning, New Delhi
9. "Network Security" by Atul Kahate

M.Sc. (Computer Science)/MCA Fifth Semester

COURSE TITLE: OBJECT ORIENTED PROGRAMMING **COURSE No.:** MCSC-501
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

Unit–I

Introduction: Evolution of OO Methodology, Basic Concepts of OO Approach, Comparison of Object Oriented and Procedure Oriented Approaches, Advantages of OOPs, Applications of OOPs. OO Concepts: Abstraction, Encapsulation, Inheritance, Polymorphism,

Unit-II

Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, String handling, Networking.

Unit-III

Java Applet, creating simple applet program, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

Unit-IV

Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.

Unit-V

JDBC: The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database.
Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, **Introduction to RMI (Remote Method Invocation):** A simple client-server application using RMI.

REFERENCE BOOKS.-

1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH
3. Balagurusamy E, "Programming in JAVA", TMH
4. Dustin R. Callway, "Inside Servlets", Addison Wesley
5. Mark Wutica, "Java Enterprise Edition", QUE
6 Steven Holzner, "Java2 Black book", dreamtech

Integrated M.Sc. (Computer Science)/MCA Fifth Semester

COURSE TITLE: Advanced Database Systems **COURSE No.:** MCSC502

Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100

DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

Unit-I

Introduction: Database system concepts, Advantages of database systems over file systems, database users; Data models, Database schema, Three-level Schema architecture, Data Independence. Database languages; DDL, DML, DCL. Database environments.

Unit-II

Database design concepts: The ER model revisited, Enhanced ER model: Subclasses, Super classes, Inheritance, Specialization and Generalization, Constraints, Relational model concepts, Relational database design: Functional Dependencies, Normalization (Upto 5th Normal Form)

Unit-III

Introduction to Query Languages: Relational Algebra, Relational Calculus, SQL and PL/SQL using Oracle. Introduction to MYSQL and IBM DB2 tools.

Unit-IV

Transaction Processing: Transaction concept, ACID Properties concurrent execution, isolation, testing for serializability, Concurrency control: lock based - time-stamp based - validation based protocols, multi-version schemes, deadlock handling. Database security, Database recovery and Backup techniques.

Unit-V

Overview of advance topics in database technologies: Parallel databases, Distributed Databases , Client-Server Architecture Object oriented databases, Active database concepts, Temporal database concepts, Spatial databases, Deductive databases; Mobile databases, Multimedia Databases, Geographic information systems (GIS); XML and Internet Databases: Structured, Semi-structured and Unstructured Data, Mobile databases, Big data concepts, Biometric databases

REFERENCE BOOKS:

1. Elmasri and Navathe, Fundamentals of Database Systems [5e], Pearson Education.
2. Korth, Silberchatz, Sudarshan , Database System Concepts[5e], McGraw-Hill.
3. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, McGraw-Hill
4. Shaum's Outlines, Relational Data Base systems, McGraw-Hill
5. Peter Rob and Coronel, Database Systems, Design, Implementation and Management, Thomson Learning.
6. C.J.Date, Longman, Introduction to Database Systems, Pearson Education
7. Thomas Connolly,Carolyn Begg, Database Systems, [3e], Pearson Education

Integrated M.Sc. (Computer Science)/MCA Fifth Semester

COURSE TITLE: E-Commerce **COURSE No.: MCSC503**
Internal Assessment=25 Mid-term Exam.=25 End –Term Exam. = 50 Total Marks= 100
DURATION OF EXAM: 3 HOURS **Lectures: 4 hours per week**

Unit-I

Introduction: Definition of Electronic Commerce, traditional commerce vs e-commerce services, e-business, elements of e-commerce, Applications, advantages & limitations, need for e-Commerce, driving forces of e-commerce. Services in e-commerce. Brief history of e-commerce, process of e-commerce , impact of E-commerce on business, e- Commerce Laws.

UNIT-II

Business Models and infrastructure: E-Commerce Models: B2C,B2B, C2C,C2B,B2 Government, Government to Business, Peer 2 Peer, M-commerce. Other models – Brokerage Model, Aggregator Model, Info-mediary Model, Community Model and value chain Model. Supply Chain Management.

E-Strategy:Information and strategy, seven dimensions of E-commerce strategy,

Unit-III

E-payments Systems: Traditional & modern Payments System, Overview of e-payment systems, Types of E-payment systems- digital cash, e-cheque, credit cards, currency servers, Smart Cards, debit cards, digital wallets, types of receipts, steps for electronic payments, Payment Security, Net banking , Payment gateways, Digital Certificates.

Technologies for e-commerce: Electronic Data Interchange (EDI)- Definition, Characteristics of EDI, advantages and limitations, Applications of EDI; Internet, Intranet, Extranet, Integration with back end Information systems

Unit-IV

E-commerce Framework: Technological, Managerial, Legal, architectural. Client server architecture of e-commerce. Benefits of client server architecture, types of client server architecture-two tier and three tier architectures.

E-commerce Marketing and Website design: Internet marketing, objectives and components of internet marketing, marketing strategies. Introduction to e-commerce websites, setting up of a site, components of business to consumer web site design.

Unit-V

Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device.

Security issues in E-Commerce: Security risk of E-Commerce, Types of threats.

Case study of a business to consumer (B2C) e-commerce model.

REFERENCE BOOKS:

1. Bharat Bhaskar, Electronic Commerce Framework Technologies and Applications, Tata McGraw Hill.

2. Ravi Kalakota & A.B. Whinston, Frontiers of Electronic Commerce, Pearson Education.
3. Ravi Kalakota & A.B. Whinston, Electronic Commerce – A Manager's Guide, Pearson Education.
4. Pete Lohsin , John Vacca "Electronic Commerce", New Age International
5. P. T. Joseph, E-Commerce: A Managerial Perspective, PHI, 2002
6. Tannenbaum, Computer Networks, sixth edition, Pearsons Publishing
7. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education
8. E-Commerce: The Cutting Edge of Business – Kamblesh Bajaj and Debjani Nag, Tata McGraw Hill

Semester-V (for the examination to be held in December 2015)

Course No.	Title	Credits	Total Marks
MCSA501	Neural Networks And Genetic Algorithms	4	100
MCSA502	Data Warehousing And Data Mining	4	100
MCSA503	Network Security & Cryptography	4	100
	Elective-II	4	100
MCSA550	Laboratory- Practical's based on MCSA501,MCSA502 & MCSA503	8	100
	Elective course offered by other Departments	4	100
	Total	**28**	**700**

Semester-VI (for the examination to be held in June 2016)

Course No.	Title	Credits	Total Marks
MCSA-600	Major Project	24	600
	Total	**24**	**600**

Evaluation of the Project

The project submitted by the students will be evaluated by Internal and External examiners. The internal examiner will evaluate for 200 marks (150 marks for project evaluation and project report and 50 marks for the project viva). The external examiner will evaluate for 400 marks (300 marks for project evaluation and project report and 100 marks for the project viva).

Annexure - 03

CENTRAL UNIVERSITY OF JAMMU

8/8 TRIKUTA NAGAR, JAMMU

Notification

It is hereby notified for the information of all concerned that, on the recommendations of the Head of the Department, HRM & OB, and opinion of the subject experts the Vice Chancellor, in anticipation of approval of the Academic Council, has been pleased to authorize that the title of Course No. IMPHRM – 102 of the Integrated M. Phil–Ph. D programme in HRM First Semester for the Academic Session 2013-14 be read as, **"Contemporary Issues of People Management"**, instead of **"Contemporary Issues of Public Management"**.

Further, the Vice Chancellor has been pleased to authorize continuation of the said Course No. IMPHRM – 102 of the Integrated M. Phil–Ph. D programme in HRM for the Academic Session 2014-15.

Registrar
24/7/14

F.NO. 4-5/HRM/CUJ/Regr/2014/ 3232-58
Dated: 25.07.2014

Copy to:-

1. All Deans of Schools
2. All HoDs
3. Sr. Consultant
4. Academic Coordinator
5. Dy. Registrar(Academic)
6. Asstt. Registrar(Academic)
7. Asstt. Registrar(Examinations)
8. Staff officer to Vice Chancellor
9. PS to PVC
10. Guard File
11. Office File

Annexure - 04

Course Curriculum
For
M.Sc. Botany
(2015-2016)

SEMESTER WISE DISTRIBUTION OF COURSES AND CREDITS

Semester-1

Course Code	Paper	Credit	CIA [1]	MSE[2]	ESE[3]	Total
MBOT 101*	Viruses, Mycoplasma and Bacteria	4	25	25	50	100
MBOT 102*	Fungi and Plant Pathology	4	25	25	50	100
MBOT 103*	Cytology, Genetics and Cytogenetics	4	25	25	50	100
MBOT 104*	Ecology	4	25	25	50	100
MBOT 151	Laboratory Course-I (based on MBOT101 and BOTC104)	4	-	50	50	100
M BOT 152	Laboratory Course-II (based on MBOT102 and BOT103)	4		50	50	100

Semester-II

Course Code	Paper	Credit	CIA [1]	MSE[2]	ESE[3]	Total
MBOT 201*	Embryophyta I; Algae and Bryophytes	4	25	25	50	100
MBOT 202*	Embryophyta II; Pteridophytes and Gymnosperms	4	25	25	50	100
MBOT 203*	Taxonomy of Flowering Plants	4	25	25	50	100
MBOT 204*	Cell and Molecular Biology	4	25	25	50	100
MBOT 501	Laboratory Course-I (based on PSBOTC201 and PSBOTC204)	4	-	50	50	100
MBOT 502	Laboratory Course -II (based on PSBOTC202 and PSBOTC203)	4	-	50	50	100

Semester-III

Course Code	Paper	Credit	CIA [1]	MSE[2]	ESE[3]	Total
MBOT301*	Plant Anatomy	4	25	25	50	100
MBOT302*	Reproduction of Flowering Plants	4	25	25	50	100
MBOT303*	Plant Physiology and Biochemistry	4	25	25	50	100
MBOT304*	Economic Botany	4	25	25	50	100
MBOT351	Laboratory course-I (based on BOT301 and BOT302)	4	-	50	50	100
MBOT352	Laboratory course-II (based on BOT303 and BOT304)	4	-	50	50	100

Semester-IV

Course Code	Paper	Credit	CIA [1]	MSE[2]	ESE[3]	Total
MBOT401*	Biodiversity and Conservation	4	25	25	50	100
MBOT402*	Plant Breeding and Biostatistics	4	25	25	50	100
MBOT403*	Biotechnology	4	25	25	50	100
MBOT404*	Evolution	4	25	25	50	100
MBOT451	Laboratory course (based on BOT401 and BOT 404)	4	-	50	50	100
MBOT452	Laboratory course (based on BOT402 and MBOT 403)	4	-	50	50	100

* Core courses

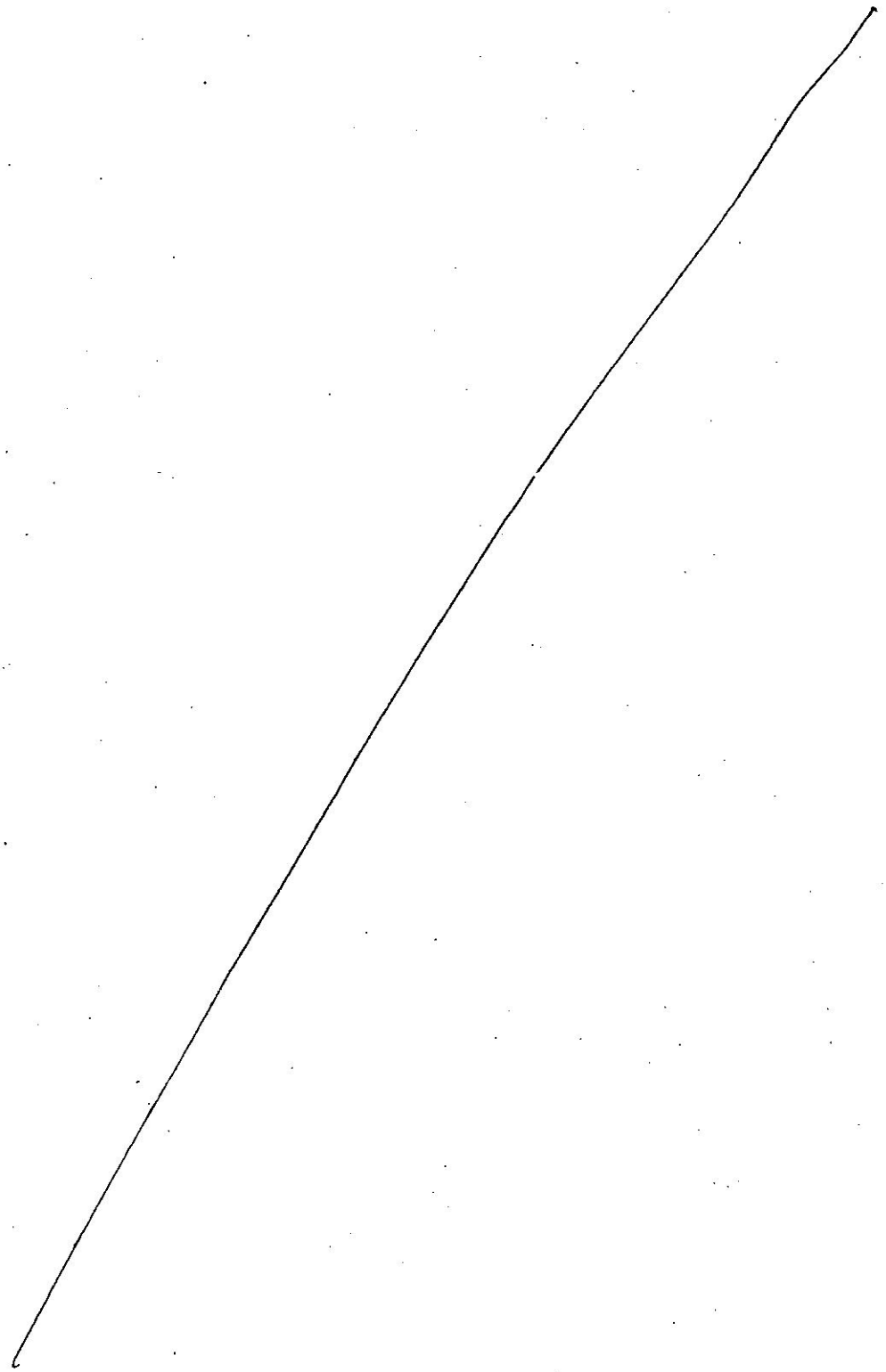
1 Continuous internal assessment based on seminar/ assignment/ quiz

2 Mid semester exam.

3 End semester exam.

Department of Botany Offers Following University Wide Courses for students other than Masters in Botany (2015-2016)

MBOT 175	Ecology, Environment and Conservation	4	25	25	50	100
MBOT 275	Plants and Human Welfare	4	25	25	50	100
MBOT375	Biotechnology and human welfare	4	25	25	50	100
MBOT475	Plant Propagation	4	25	25	50	100



SEMESTER WISE DISTRIBUTION OF COURSES AND CREDITS

Semester-1

Course Code	Paper	Credit	Contact hours per week		
			L	S/Q/T	P
MBOT 101*	Viruses, Mycoplasma and Bacteria	4	4	1	0
MBOT 102*	Fungi and Plant Pathology	4	4	1	0
MBOT 103*	Cytology, Genetics and Cytogenetics	4	4	1	0
MBOT 104*	Ecology	4	4	1	0
[illegible]	Laboratory Course-I (based on MBOT101 and BOTC104)	4	0	0	6
M BOT 152	Laboratory Course-II (based on MBOT102 and BOT103)	4	0	0	6

Semester-II

Course Code	Paper	Credit	Contact hours per week		
			L	S/Q/T	P
MBOT 201*	Embryophyta I; Algae and Bryophytes	4	4	1	0
MBOT 202*	Embryophyta II; Pteridophytes and Gymnosperms	4	4	1	0
MBOT 203*	Taxonomy of Flowering Plants	4	4	1	0
MBOT 204*	Cell and Molecular Biology	4	4	1	0
MBOT 501	Laboratory Course-I (based on PSBOTC201 and PSBOTC204)	4	0	0	6
MBOT 502	Laboratory Course -II (based on PSBOTC202 and PSBOTC203)	4	0	0	6

Semester-III

Course Code	Paper	Credit	Contact hours per week		
			L	S/Q/T	P
MBOT301*	Plant Anatomy	4	4	1	0
MBOT302*	Reproduction of Flowering Plants	4	4	1	0
MBOT303*	Plant Physiology and Biochemistry	4	4	1	0
MBOT304*	Economic Botany	4	4	1	0
MBOT351	Laboratory course-I (based on BOT301 and BOT302)	4	0	0	6
MBOT352	Laboratory course-II (based on BOT303 and BOT304)	4	0	0	6

Semester-IV

Course Code	Paper	Credit	Contact hours per week		
			L	S/Q/T	P
MBOT401*	Biodiversity and Conservation	4	4	1	0
MBOT402*	Plant Breeding and Biostatistics	4	4	1	0
MBOT403*	Biotechnology	4	4	1	0
MBOT404*	Evolution	4	4	1	0
MBOT451	Laboratory course (based on BOT401 and BOT 404)	4	0	0	6
MBOT452	Laboratory course (based on BOT402 and MBOT 403)	4	0	0	6

* Core courses
L = Lecture
S= Seminar
Q= Quiz
T= Tutorial
P= Practical

Semester-1

Course Code	Paper	Credit	CIA [1]	MSE[2]	ESE[3]	Total
MBOT 101*	Viruses, Mycoplasma and Bacteria	4	25	25	50	100
MBOT 102*	Fungi and Plant Pathology	4	25	25	50	100
MBOT 103*	Cytology, Genetics and Cytogenetics	4	25	25	50	100
MBOT 104*	Ecology	4	25	25	50	100
MBOT 151	Laboratory Course-I (based on MBOT101 and BOTC104)	4	-	50	50	100
M BOT 152	Laboratory Course-II (based on MBOT102 and BOT103)	4	-	50	50	100

COURSE TITLE: VIRUSES, MYCOPLASMA AND BACTERIA

Course No.: MBOT101
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25
ESE: 50

Objective :

The course provide scientific basis to the simplest form of life and its requirements. This course also provide information about the viruses and bacteriophages.

Unit-I: Eubacteria and Archaebacteria

1.1 Discovery; bacterial size, shape and arrangement, types of reproduction.
1.2 Eubacterial cell wall, structures external to the bacterial cell wall (glycocalyx, flagella, pili), plasma membrane, cytoplasm and cytoplasmic inclusions.
1.3 Bacterial endospores, their formation, structure and types.
1.4 General account of Archaebacteria, ultrastructure of cell wall, types (methanogenic, extreme halophiles and thermoacidophiles).

Unit-II: Growth, Culture and maintenance of bacteria

2.1 Nutritional requirements of bacteria with reference to macro nutrients, micro nutrients, trace nutrients and growth factors.
2.2 Nutritional types of bacteria.
2.3 Bacterial growth curve, generation time and measurement of growth.
2.4 Types of culture media, isolation, culturing and maintenance.

Unit-III: The Animal Viruses

3.1 Distinguishing characteristics of animal viruses, ultrastructure, capsid symmetry.
3.2 Replication of animal viruses with reference to Adenoviruses, Picornaviruses and Retroviruses.
3.3 Isolation, purification and cultivation of animal viruses.
3.4 Transmission and strategies for preventing animal viral infection.

Unit-IV: The Plant Viruses

4.1 Structural characteristics of plant viruses with special reference to TMV and TYMV.
4.2 Symptoms of virus infection in plants; Isolation and purification of stable plant viruses.
4.3 Infection of host plants by viruses, replication of RNA and DNA plant viruses.
4.4 Transmission and control of plant viruses.

Unit-V: Bacteriophages and other Virus-like infectious agents

5.1 Discovery, significance, isolation and cultivation of bacteriophages.

5.2 Structural characteristics of bacteriophages with special reference to T_4, lambda and M13.

5.3 Replication of virulent, temperate and filamentous DNA bacteriophages (T_4, lambda and M13)

5.4 Viroids and prions- discovery, structure and important diseases caused by them.

Literature recommended:

1 Atlas R. M. (1995): Principles of Microbiology. Mosby-Year Book Inc. St. Louis, Missouri.

2 Black, J. G. (2013). Microbiology: 8th Edn. John Wiley & Sons. New York.

3 Mathews R E F (1981). Plant Virology. Academic Press.

4 Pepper, L. L; Charles P G. and Terry J G. (2015). Environmental Microbiology. Academic press, USA.

5 Pommerville and Jaffery 2010. Alcamios Fundamentals of Microbiology. Jones and Bartlett, USA.

6 Sumbali G. and Mehrotra [illegible] Principles of Microbiology. 1st Edn. Tata McGraw Hill Publishing Co. Ltd. New Delhi.

7 Tortora G. J, Funke B. R. and Case C. L. (1992). Microbiology An Introduction 4th ed. The Benjamin/Cummings Publishing Company, Inc. California, USA

8 Willey J. and Sherwood M. (2011). Prescott's Microbiology. 8th Edn. Tata McGraw Hill Publishing Co. Ltd. New Delhi

9 Wessner, Dupant and Charles. 2013. Microbiolgy. Wiley, USA.

Recommended Laboratory Exercises.

1. Principle, operation and study of various components of a compound microscope.
2. Micrometry – calibration of ocular micrometer with a stage micrometer.
3. Using ocular micrometer for measuring bacterial cells.
4. Preparation of culture media (Nutrient agar), plates and tubes for culturing and subculturing of bacteria;
5. Sterilization of glassware, culture media, inoculating loop, etc.
6. Staining techniques- Simple, Gram's staining, negative staining, cell wall staining, endospore staining.
7. Isolation of bacteria from soil by dilution plate technique.
8. Study of plant and animal viral symptoms through herbarium sheets, photographs, charts, etc.

COURSE TITLE: FUNGI AND PLANT PATHOLOGY

Course No.: MBOT102
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25
ESE: 50

Objectives:

This course has been conceived to equip students with the knowledge of various plant diseases caused by different pathogens, means of their entry in plants and defense system of plants. Besides, the course also deals with the post harvest losses and methods generally adopted for their management.

Unit-I Structure and reproduction of fungi.

1.1 General characters of fungi, cell ultrastructure, cell wall composition, thallus organization (unicellular and multicellular), nutrition (saprobic, biotrophic, symbiotic), reproduction.

1.2 Recent trends and criteria used in the classification of fungi with reference to vegetative and reproductive structures.

1.3 General account of Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina.

1.4 Homothallism and heterothallism, heterokaryosis and parasexuality in fungi.

Unit-II Disease in plants and disease inoculum.

2.1 Concept of disease in plants, significance of plant diseases, disease triangle.

2.2 Production, types and survival of inocula of plant pathogens.

2.3 Active and passive dispersal of infectious plant pathogens.

2.4 Plant disease epidemic forecast, disease warning systems and important examples of plant disease forecast systems.

Unit-III Pathogenesis and chemical weapons of pathogenesis

3.1 Pre-penetration activities of the pathogens on host surface, direct penetration through intact plant surfaces, penetration through wounds and natural openings, post penetration development.

3.2 Defence mechanisms in plants (morphological, histological, cytoplasmic and biochemical).

3.3 Role of enzymes and toxins (non-host specific and host specific toxins) in plant diseases.

3.4 Role of growth regulators and polysaccharides in plant diseases.

Unit-IV Post- harvest pathology

4.1 Concept and extent of post-harvest losses, factors influencing post-harvest storage rots.

4.2 Post-harvest decay of fruits and vegetables with special reference to apple and tomato.

4.3 Post-harvest decay of seeds, important seed borne diseases of wheat and rice.

4.4 Mycotoxin producing storage fungi and major mycotoxins produced by them.

Unit-V Management of plant diseases.

5.1 Regulatory and biological methods-quarantine and inspection, antibiosis, fungistasis.

5.2 Cultural methods- eradication of secondary hosts, crop rotation, rogueing, tillage, sanitation, creating conditions unfavourable to the pathogens, nutritional and soil amendments.

5.3 Chemical methods- requisites of a good fungicide, protective and systemic fungicides, seed and soil treatment by fungicides.

5.4 Breeding for disease resistance-important methods for developing resistant varieties, types of plant resistance to pathogens, genetics of virulence in pathogen and resistance in host plant.

Literature recommended:

1. Alexopoulus, C.J., Mims, C.W. and Blackwell, M. (1996). Introductory Mycology. John Wiley & Sons Inc. New York.
2. Mehrotra, R. S. (1980). Plant Pathology. Tata McGraw Hill Publishing Co. Ltd. New Delhi.
3. Mehrotra, R.S. and Aneja, K.R. (1990). An introduction to Mycology. Wiley Eastern Ltd. New Dlehi.
4. Singh, R.S. (1986). Plant Diseases. Oxford & IBH Publishing Company. Ltd. New Delhi.
5. Sumbali G. (2010). The Fungi. 2nd Edn. Narosa Publishing House, New Delhi.
6. Webster. J. (1985). Introduction to Fungi. Cambridge University Press, USA.
7. Nene, Y.L. and Thapiyal, P.N. (1971). Fungicides in Plant disease control. Oxford & IBH Publishing Co. Pvt. Ltd.

Recommended Laboratory Exercises.

1. Morphological characters of some microfungi (*Curvularia, Alternaria, Fusarium, Penicillium, Colletotrichum, Trichothecium, Aspergillus, Mucor, Rhizopus, Syncephalastrum, Chaetomium, Emericella, Peronospora, Phyllactinia and Uncinula*).
2. Morphological characters of some macrofungi (*Agaricus, Morchella, Pleurotus, Geastrum* and *Calocybe*).
3. Symptoms and histopathology of field diseases of local crop plants.
4. Post-harvest fungal diseases of fruits and vegetables.
5. Preparation of PDA, sterilization, planting and making of slants.
6. Isolation, purification, culturing and subculturing of fungal pathogens.

COURSE TITLE: CYTOLOGY, GENETICS AND CYTOGENETICS

Course No.: MBOT 103
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25
ESE: 50

Objectives:

Genetics and cytogenetics provide scientific basis to the art of plant and animal breeding. Genetic improvement of crop plants cannot be sound, unless their genetic architecture has been fully understood. This course aims at equipping the student with up-to-date knowledge of the nature and structure of genetic material and principles of heredity in diploid, polyploid and aneuploid organisms.

Unit-I Chromatin organization.

1.1 Chromosome morphology; molecular organization of nucleosome, centromere and telomere.
1.2 Euchromatin and heterochromatin; banding patterns; karyotype evolution.
1.3 Specialized chromosomes; structure, occurrence and behavior of B- and sex chromosomes, and polytene and lampbrush chromosomes.
1.4 Organization of chloroplast and mitochondrial genomes.

Unit-II Numerical alterations in the genome.

2.1 Origin, occurrence, production and meiosis of monoploids and haploids.
2.2 Origin and production of autopolyploids: concept of chromosome and chromatid segregation.
2.3 Allopolyploids - types, genome constitution and analysis of wheat, *Arachis*, *Brassica* and cotton.
2.4 Origin, occurrence, production, meiosis and detection of monosomics, trisomics (primary, secondary, tertiary), nullisomics and tetrasomics.

Unit-III Genetic recombination and gene mapping.

3.1 Recombination: Holliday's model of recombination at molecular level, role of Rec A and Rec B,C,D enzymes; site-specific recombination.
3.2 Chromosome mapping, genetic markers, concept of molecular maps.
3.3 Correlation of genetic and physical maps; somatic cell genetics-an alternative approach to gene mapping.
3.4 Genetic transformation, conjugation and transduction in bacteria.

Unit-IV Gene structure, expression and sudden changes.

4.1 Genetic fine structure; cis-trans test; r II locus; fine structure analysis in eukaryotes.

4.2 Regulation of gene expression in prokaryotes (*lac* operon & *trp* operon) and eukaryotes (Methylation, hormonal control, Britten - Davidson's model).

4.3 Spontaneous and induced mutations; physical and chemical mutagens; molecular basis of gene mutations; DNA damage and repair mechanisms.

4.4 Transposable elements in prokaryotes and eukaryotes; Ac-Ds & Spm-dSpm in maize, Copia & P elements in *Drosophila* and Ty elements of yeast.

Unit-V Cytogenetics of higher plants.

5.1 Characterization of mono-and trisomics and their use in chromosome mapping of diploid and polyploid species.

5.2 Breeding behaviour and genetics of complex translocation heterozygotes, translocation tester sets; Robertsonian translocations.

5.3 Breeding behaviour and genetics of inversion heterozygotes.

5.4 Production, characterization and utility of alien addition and substitution lines

Literature recommended:

1. Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K. and Wason, J.D. (1989). Molecular Biology of the Cell. Garland Publishing Inc. NY & Dendor.
2. Avers, C. (1984). Genetics. PWS Publishers.
3. Brown, T.A. (1989). Genetics: A Molecular Approach. VNR international.
4. Brown, T.A. (1990). Gene Cloning-An introduction. Chapman and Hal London.
5. Garber, G.B. (1972). Cytogenetics. McGraw Publishing Co. Ltd.
6. Gupta, P.K. (1997). Elements of Biotechnology. Rastogi Publishers, Meerut.
7. Gupta, P.K. (1997). Genetics. Rastogi Publishers, Meerut.
8. Gupta, P.K. (1002). Cell and Molecular Biology. Rastogi Publication, Meerut.
9. Hartl, D.L. and Jones, E.W. (1000). Genetics – An Analysis of Genes and Genomes. Jones & Bartlett Publishers.
10. Karp, G. (1999). Cell and Molecular Biology – Concepts and Experiments. John Wiley and Sons Inc.
11. Klug (2012). Concept of Genetics. 10th Edn. Pearson publications.
12. Krebs, J. E. (2014). Lewin 's Genes XI. John Wiley and Sons Inc.
13. Lodish, H., Berk, A., Kaiser, C.A., Krieger, M., Scott, M.P., Bretscher, A., Ploegh, H. and Matsudaira, P. (2013). Molecular Cell Biology. 7th Edn. W. H. Freeman and Company. New York.
14. Old, R.W. and Primrose, S.B. (1994). Principles of Gene Manipulation. Blackwell Scientific Publication, London.
15. Russel, P.J. (1998). Genetics. Benjamin/Cummings Publishing Co. Inc.
16. Sinnott, E.W., Dunn L.C. and Dobzhansky T. (1958). Principles of Genetics. Kugakusha Co. Ltd.
17. Snustad, D.P. and Simmons, M.J. (1000). Principles of Genetics. John Wiley & Sons, NY.
18. Stansfield, W.D. (1991). Genetics (Schaums outlines), McGraw Hill.
19. Strick berger, M.W. (1976). General Genetics. McMillan Publishing Co. Inc. NY.
20. Swanson C.P., Merz, T. and Young, W.J. (1967). Cytogenetics. Prentice Hall of India, Pvt. Ltd.

21. Watson, J.D., Hopkins, N.H., Roberts, J.W., Steitz, J.A. and Weiner A.M.L. (1987). Molecular Biology of the Gene. The Benjamin/Cummings Publishing Company Inc.

Laboratory Exercises

1. Karyotype analysis and preparation of ideogram.
2. Study of somatic chromosomes from root tip squashes.
3. Study of chromosomes during meiosis.
4. Study the polytene chromosomes in *Chironomus*.
5. Study the effect of induced polyploidy on plant phenotype, meiosis, pollen and seed fertility and fruit set.
6. Work out the effect of mono and trisomy on fertility and meiotic behavior.
7. Study the effect of translocation heterozygosity on chromosome pairing, chromosome disjunction and pollen and seed fertility.
8. Study the meiosis of complex translocation heterozygotes.
9. Construction of genetic maps from the given data.
10. Calculation of recombination frequencies.
11. Determination of linkage relationships.
12. Study of Mendelian and non-Mendelian inheritance patterns.

COURSE TITLE: ECOLOGY

Course No.: MBOT104
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25
ESE: 50

Objectives:

The course is designed to make students understand abiotic and biotic components of the ecosystems and their interactions at different levels. The course also emphasizes on the extent of biodiversity, its depletion and management using various conservation approaches.

Objectives:

The course is designed to make students understand abiotic and biotic components of the ecosystems and their interactions at different levels. The course also emphasizes on the extent of biodiversity, its depletion and management using various conservation approaches.

Unit 1 Ecology and Environment

1.1 Ecology; concept and history; sub-divisions of ecology; levels of study; ecology as inter-disciplinary science.
1.2 Physical environment: Lithosphere (Earth's interior), hydrosphere (hydrologic cycle), atmosphere (composition and layering of atmosphere); Surface receipt of solar radiations, effect of different factors on surface receipt of solar radiations.
1.3 Types and characteristic of biomes; biogeographic zones of India.
1.4 Concept of habitat and niche, types of niche and niche parameters (niche width, overlap and complementarity).

Unit 2 Population and Community Ecology

2.1 Plant population- definition, characteristics, age structure, population growth, population regulation; presentation of demographic data.
2.2 Population structure, metapopulations, effective population size, population bottlenecks.
2.3 Species interactions; competition, parasitism, predation, herbivory, mutualism.
2.4 Nature and concept of biotic community, community analysis (analytic & synthetic characters), life forms and biological spectrum.

Unit 3 Community and Ecosystem Development

3.1 Succession- types, models of succession with reference to resource ratio hypothesis of succession.
3.2 Climax community, theories of climax (monoclimax, polyclimax and disequilibrium theories).
3.3 Ecosystem structure: Abiotic component-parent material, weathering and soil formation.

3.4 Biotic Component: food chains, food webs, eltonian pyramids, decomposition and function, primary productivity (methods of measurements, global patterns.

Unit 4 Ecosystem functioning

4.1 Primary Productivity (gross and net primary productivity), primary productivity of different ecosystems, factors influencing primary productivity.

4.2 Energy flow in ecosystems and laws of thermodynamics, flow of energy in autotroph and detritus based ecosystems.

4.3 Biogeochemical cycling in ecosystems; cycling of nitrogen, carbon, phosphorus and sulphur.

4.4 Litter decomposition: leaching, fragmentation and chemical alteration of litter; temporal and spatial heterogeneity of decomposition; factors controlling decomposition.

Unit 5 Environmental Issues

5.1 Air, water and soil pollution: types of pollutant, their [illegible] impact

5.2 Greenhouse effect and global warming: causes, trends in emission of GHG, impact of climate change

4.3 Biodiversity – assessment, conservation and management, biodiversity act of India and related international conventions.

4.4 Sustainable development, natural resource management in changing environment..

Literature recommended:

1. Claude, F., Christiane, F., Medori, P. and Devaux, J. (1001). Ecology: Science and Practice. Oxford and IBH publishing Co. Pvt. Ltd. New Delhi.
2. Trevor, B. and Graham, R. (1005). An Introduction to Molecular Ecology. Oxford University Press.
3. Begon, M., Townsend, C.R. and Harper, J.L. (1006). Ecology from Individuals to Ecosystems. 4th Edn. Blackwell publishing, USA.
4. Eisner, T. and Meinwald, J. (1995). Chemical Ecology: The Chemistry of Biotic Interaction, National Academies Press.
5. Ali, M. (2012). Diversity of Ecosystems, In Tech.
6. Subrahmanyan, N. S and Sambamurty A.V.S.S. (1006). Ecology. 2nd Edn. Narosa, New Delhi.
7. Chapman, J.L and Reiss, M.J. (1998). Ecology: Principles and Applications. Cambridge University Press.
8. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall of India Pvt. Ltd. New Delhi.
9. Odum, E. P. (1971). Fundamentals of Ecology. Saunders, Philadelphia.
10. Dash, M. (1999). Fundamentals of Ecology. Tata Mc-Graw-Hill Publishing Company Ltd. New Delhi.
11. Ambasht, R.S. and Ambasht N.K. (1995). A Textbook of Plant Ecology. 11th Edn. Students Friends & Co. Varanasi, India.

Laboratory Exercises

1. Determination of the Minimum requisite size of a sampling unit for vegetation study and calculation of Importance Value Index of herbaceous flora.
2. Determination of the plant density through plotless sampling methods.
3. Determination of α , β and γ diversity and various diversity indices.
4. Determining primary productivity in terms of biomass and chlorophyll content.
5. Estimation of the gross and net primary productivity of an aquatic ecosystem by light and dark bottle method.
6. Determination of phytoclimate and biological spectrum.
7. Determination of dissolved oxygen in the aquatic water body.
8. Determination of the water holding capacity and cation exchange complex of different soils.
9. Determination of the stomatal index in the plants grown in polluted and unpolluted water samples.

Semester-II

Course Code	Paper	Credit	CIA [1]	MSE[2]	ESE[3]	Total
MBOT 201*	Embryophyta I; Algae and Bryophytes	4	25	25	50	100
MBOT 202*	Embryophyta II; Pteridophytes and Gymnosperms	4	25	25	50	100
MBOT 203*	Taxonomy of Flowering Plants	4	25	25	50	100
MBOT 204*	Cell and Molecular Biology	4	25	25	50	100
MBOT 501	Laboratory Course-I (based on PSBOTC201 and PSBOTC204)	4	-	50	50	100
MBOT 502	Laboratory Course-II (based on PSBOTC202 and PSBOTC203)	4	-	50	50	100

COURSE TITLE: EMBRYOPHYTA- I; ALGAE AND BRYOPHYTES

Course No.: MBOT201
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25
ESE: 50

Objectives:

The course has been designed to introduce the students with the most primitive green plant groups. Being the only groups with gametophytic mature plant, they hold key to understanding of large number of evolutionary trends in plants kingdom.

Unit- 1 Algal classification and diversity- I

1.1 Comparative survey of important systems of classifications of algae; modern trends in algal classification.
1.2 Diagnostic features of algal groups; range of thallus and reproductive diversity.
1.3 Life history patterns; parallelism in evolution.
1.4 Comparative account of algal pigments in various groups.

Unit-2 Salient features of Cyanophyta, Chlorophyta, Bacillariophyta, Xanthophyta, Phaeophyta and Rhodophyta with special reference to:

2.1 Structure and composition of cell walls and flagella.
2.2 Structure and types of chloroplasts.
2.3 Structure of pyrenoids and eyespots.
2.4 Types of reserve storage products.

Unit -3 Classification of bryophytes and diversity in liverworts and hornworts

3.1 Classification of bryophytes: an outline; general features of three major groups liverworts, hornworts and mosses); characters used for taxonomic delimitation.

3.2 General features and classification of hepaticopsida; Orders Calobryales, Sphaerocarpales and Marchantiales- morpho-anatomical and reproductive features of gametophyte and sporophyte.

3.3 Orders Metzgeriales and Jungermanniales- morpho-anatomical and reproductive features of gametophyte and sporophyte.

3.4 Order Anthocerotales- morpho-anatomical and reproductive features of gametophyte and sporophyte.

Unit -4 : Moss diversity and classification

4.1 An outline of moss classification; evolutionary lines in mosses.

4.2 Orders Sphagnales and Andreales- morpho-anatomical and reproductive features of gametophyte and sporophyte.

4.3 Orders Buxbaumiales, Archidiales, Funariales and Polytrichales- morpho-anatomical and reproductive features of gametophyte and sporophyte.

4.4 Order Bryales- morpho-anatomical and reproductive features of gametophyte and sporophyte.

Unit 5 : Economic importance of algae and origin of bryophytes

5.1 Economic importance of algae (a general account); algae as pollutants and pollution indicators.

5.2 Toxic algae; algal blooms; algae in biotechnology.

5.3 Habitat diversity of bryophytes; trends in evolution of their gametophytes and sporophytes.

5.4 Fossil bryophytes; origin of bryophytes.

Literature recommended:

I. Algae

1. Fritsch, F.E. (1945). The Structure and Reproduction of Algae. Vol. I & II. Cambridge University Press.
2. Smith, G.M. (1955). Cryptogamic Botany. Vol. I. McGraw Hill Co. Ltd.
3. Bold. H.C. and Wynne, M. J. (1978). Introduction to the Algae: Structure and Function. Prentice Hall of India.
4. Trainor, F.R. (1978). Introductory Phycology. John Wiley and Sons Inc.
5. Kumar, H.D. and Singh, H.N. (1982). A Text Book of Algae. East West Press.

II. Bryophytes

1. Puri, P. (1985). Bryophytes: A Broad Perspective. Atma Ram & Sons, Delhi.
2. Rashid, A. (1998). An Introduction to Bryophyta, Vikas Publ. House, Pvt. Ltd.
3. Schuster R. M. (1983). New manual of Bryology Vol. I & II. The Hattori Botanical Laboratory, Japan.
4. Smith, G.M. (1955). Cryptogamic Botany Vol II, Tata McGraw Publ. Company, Inc., N.Y.
5. Vander Poorten, A. and Goffinet, B. (1009). Introduction to Bryophytes. Cambridge University Press, New York.

Laboratory Exercises

1. Morphological study of representative members of various groups of algae.
2. Study of morphology, anatomy and reproductive structures of representative members of bryophytes.

COURSE TITLE: EMBRYOPHYTA - II: PTERIDOPHYTES AND GYMNOSPERMS

Course No.: MBOT202
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25
ESE: 50

Objectives:

The course has been designed to introduce the students with the evolution of vascular system in plants which produce embryo in their life cycle.

Unit 1 : Classification of pteridophytes and diversity among fern allies

1.1 Classification of pteridophytes (Sporne 1975) upto ordinal level; general features of each major group.

1.2 Morpho-anatomical details of sporophyte of fossil pteridophytes: *Rhynia*, Lepidodendrales and Sphenophyllales.

1.3 Morpho-anatomical details of sporophyte and gametophyte of *Psilotum, Lycopodium, Selaginella* and *Isoetes*.

1.4 Morpho-anatomical details of sporophyte and gametophyte of *Equisetum*.

Unit 2 : Diversity among ferns

2.1 Morpho-anatomical details of sporophyte and gametophyte of eusporangiate ferns: Ophioglossales and Marattiales.

2.2 Morpho-anatomical details of sporophyte and gametophyte of proleptosporangiate ferns: Osmundales.

2.3 Morpho-anatomical details of sporophyte and gametophyte of homosporous leptosporangiate ferns - Filicales.

2.4 Morpho-anatomical details of sporophyte and gametophyte of heterosporous leptosporangiate ferns - Marsiliales and Salviniales.

Unit 3 : Evolutionary trends in Pteridophytes

3.1 Life cycle of pteridophytes with respect to alternation of generations in homosporous and heterosporous taxa; apogamy, apospory.

3.2 Stelar, soral (eu- and leptosporantiate) and prothallial evolution in pteridophytes.

3.3 Role of cytology, polyploidy and hybridization in speciation of ferns.

3.4 Origin of pteridophytes.

Unit 4 :Classification and diversity of gymnosperms

4.1 Classification of gymnosperms - past and present trends; classification of gymnosperms as proposed by Sporne (1965) and Sandra Holmes (1986); general characters of gymnosperms.

4.2 Morpho-anatomical details of vegetative and reproductive organs of Cycadales and Ginkgoales.

4.3 Morpho-anatomical details of vegetative and reproductive organs of Coniferales and Ephedrales.

4.4 Morpho-anatomical details of vegetative and reproductive organs of Welwitschiales and Gnetales.

Unit 5 : Fossil gymnosperms and importance of gymnosperms

5.1 Progymnosperms: Concept, general account.

5.2 General account of Cycadeoidales and Cordaitales.

5.3 Distribution of fossil gymnosperms at global level and living gymnosperms in India.

5.4 Economic importance of gymnosperms.

Literature recommended

1. Bierhorst, D.W. (1971). Morphology of Vascular Plants. Mac Millan Co.
2. Bower, F.O. (1923, 1926 and 1928). The Ferns. Vol. I-III, Cambridge Univ.Press.
3. Bower, F.O. (1935). Primitive Land Plants. Mac Millan Co.
4. Eames, A.J. (1936). Morphology of Vascular Plants. McGraw Hill, NY.
5. Foster, A.S. and Gifford, E.M. (1979). Comparative Morphology of Vascular Plants. W.H. Freeman & Co.
6. Parihar, N.S. (1989). The Biology and Morphology of Pteridophytes (Diversity and Differentiation). Vikas Publishing House.
7. Rashid, A. (1976). An Introduction to Pteridophytes (Diversity and Differentiation). Vikas Publishing House.
8. Sporne K.R. (1970). The Morphology of Pteridophytes. Hutchinson Univ. Library, London.

Laboratory Exercises

1. Study of fossil pteridophytes from prepared slides.
2. Morphology and anatomy of vegetative and spore bearing organs of fern allies and ferns representing various groups.
3. Comparative study of anatomy of vegetative and reproductive parts of taxa representing various orders of gymnosperms.

COURSE TITLE: TAXONOMY OF FLOWERING PLANTS

Course No.: MBOT203
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25
ESE: 50

Objective

The course is designed to understand the origin of angiosperms, their phylogeny and classification using various methods. Advanced APG treatment of plants and of plant taxonomy is important component of the course which will make students understand the progress being made in the subject of Botany.

Unit 1: Classification, identification and nomenclature

1.1 Classification : A general account; artificial, natural, phyletic, phenetic and cladistic approaches of classification.

1.2 Identification: principles and methods of identification; taxonomic keys and computer aided identification.

1.3 Nomenclature: international codes for botanical nomenclature, citation of authors, type method, naming the new species.

1.4 Taxonomy and systematics: importance and present challenges to taxonomy.

Unit II: History and origin of angiosperms

2.1 Origin of angiosperms: first traces of angiosperms, nature of probable ancestors of angiosperms, origin of monocotyledons.

2.2 Evolutionary trends in angiosperms: leaf, nodal anatomy, xylem, phloem, cambium and flower.

2.3 Phylogeny of Ranales, Amentiferae, Tubiflorae and Helobiales and their treatment in the modern systems of classification

2.4 Hypothetical construction: Bessey's dicta and throne's principles

Unit III: Plant Systematics

3.1 Plant systematics: The components and major objectives of systematics; relevance of systematic society and science.

3.2 Taxonomic evidences: morphology, anatomy and ultrastructure; embryology; palynology; cytology; phytochemistry.

3.3 Role of Floras, Field and Herbarium techniques and DNA hybridization

3.4 Amino acid sequencing in systematics.

Unit IV: Recent developments in plant taxonomy

4.1 Angiosperm Phylogeny Group; definition, and characteristic features of APG-II and APG-III

4.2 Introduction to the angiosperms: General characteristics; Basal angiosperms and Magnoliids; Basal monocots; Petaloid monocots; Commelinids; Basal eudicots and Caryophyllids; Rosids; Asterids.

4.3 Chemotaxonomy: a brief account of chemical constituents of taxonomic significance - pheromones, secondary plant metabolites and pigments.

4.4 Molecular taxonomy: proteins and taxonomy- taxonomic value of amino acid sequencing, DNA and taxonomy- analysis of DNA sequences to infer phylogenetic relationships between taxa, DNA bar coding

Unit V: New approaches in plant taxonomy

5.1 Taxonomic description of basal angiosperms: Nymphaeaceae and Magnoliaceae

5.2 Taxonomic description of basal (Araceae & Alisonataceae) and petaloid (Liliaceae & Orchidaceae) monocots

5.3 Taxonomic description of commelonid monocots: Arecaceae & Poaceae

5.4 Taxonomic description of eudicots (Ranunculaceae) & Caryophyllids (Caryophyllaceae).

Literature recommended:

1. Cole, A.J. (1969) Numerical Taxonomy. Academic Press, London.
2. Davis, P.H. and Heywood, V.H. (1973). Principles of Angiosperm Taxonomy. Robert E. Kreiger Publ. Co. New York.
3. Grant, V. (1971). Plant Speciation. Columbia University Press, New York.
4. Grant, W.F. (1984). Plant Biosystematics. Academic Press, London.
5. Harrison, H.J. (1971). New Concepts in Flowering Plant Taxomony. Hieman Educational Books Ltd., London.
6. Heslop-Harrison, J. (1967). Plant Taxonomy. English Language Book Soc. & Edward Arnold Publ. Ltd., U.K.
7. Heywood, V.H. and Moore, D.M. (1984). Current Concepts in Plant Taxonomy. Academic Press, London.
8. Jones, A.D. and Williams, A.D. (1971). Variations and Adaptations in Plant Species. Hieman & Co. Educational Books Ltd. London.
9. Simpson, M. G. (1006). Plant Systematics. Elsevier Academic Press. USA.
10. Singh, G. (2010). Plant Systematics. Science Publishers. USA.
11. Stace, C.A. (1990). Plant Taxonomy and Biosystematics. Cambridge Univ. Press.

Laboratory Exercises

1. Description of specimens from representative, locally available families.
2. Description of various species of a genus; location of key characters and preparation of keys at genetic level.
3. Compilation of field notes and preparation of herbarium sheets.

COURSE TITLE: CELL AND MOLECULAR BIOLOGY

Course No.: MBOT204
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25
ESE: 50

Objectives:

The course has been designed to introduce the students with the features of cell and its molecular organization. Molecular techniques used to study the cell components are also kept for the students of the course.

Unit-I Cell- Unique features and envelops

1.1 An overview of the diversity in structure of cell- basic organization of a plant cell: extracellular matrix in animals; structure, function and biogenesis of cell wall
1.2 Plasma membrane- chemical composition, organization of various components, fluid-mosaic model; artificial membranes.
1.3 Plasma membrane functions- transport and signal transduction, concept of carriers, pumps, channels and receptors.
1.4 Unique structures of a plant cell- structure and functions of vacuole and plasmodesmata.

Unit-II Structural organisation and function of cytoskeleton and cell organelles

2.1 Structure and role of microfilaments and microtubules.
2.2 Cell organelles- structure, biogenesis and an overview of functions of mitochondria and chloroplasts.
2.3 Internal membrane system- structure and functioning of endoplasmic reticulum and Golgi apparatus.
2.4 Microbodies- structure and functions of lysosomes, peroxisomes and melanosomes.

Unit-III Structure and function of nucleus and its contents

3.1 Nucleus; structure, nuclear pore complex and transport; ultrastructure of nucleolus.
3.2 DNA structure; A, B & Z forms; single stranded DNA; supercoiling of DNA.
3.3 DNA replication; mechanism in pro- and eukaryotes; rolling circle replication.
3.4 Transcription- mechanism and regulation; plant promoters and transcription factors.

Unit-IV Structure and function of RNA and proteins

4.1 Types of RNA- mRNA, tRNA and rRNA; their structure and biosynthesis, concept of micro-RNAs.
4.2 Introns- types and their significance; RNA editing and splicing; mRNA transport.
4.3 Translation-ribosomes; mechanism in pro- and eukaryotes; factors involved thereof.
4.4 Protein trafficking- concept of chaperones, co-translation and post-translation transport.

Unit-V Techniques in cell molecular biology

5.1 Principles and applications of light, scanning and transmission electron microscopy.
5.2 DNA sequencing methods, strategies for genome sequencing.
5.3 Protein sequencing methods, detection of post translation modification of proteins.
5.4 Genomics and its application to health and agriculture.

Literature recommended:

1. Albert B., Bray D., Lewis J., Raff M., Roberts K. and Watson J. D. (1989). Molecular Biology of the Cell. Garland Publisher Inc. NY & London.
2. Brown, T.A. (1989). Genetics: A molecular Approach. VNR International
3. Brown, T.A. (2010). Gene cloning and DNA Analysis- An introduction. 6th Edn. Wiley Blackwell.
4. Brown, T.A. (2010) Genomes. John Wiley and Sons (Asia) Pvt. Ltd.
5. Darnell, J., Lodish, H. and Baltimore, D. (1986). Molecular Cell Biology. W. H. Freeman and Company. New York.
6. De, D.N. (1000). Plant Cell Vacuoles: An introduction. CSIRO Publication, Colling wood, Australia.
7. Freifelder, D. and Malacinski (1993). Essentials of Molecular Biology. Jones and Bartlett Publishers.
8. Gardner, E.J., Simmons, M.J. and Snustad, D. (1991). Principles of Genetics. 8th Edn. John Wiley.
9. Gupta, P.K. (1997). Elements of Biotechnology. Rastogi Publication, Meerut.
10. Gupta, P.K. (1002). Cell and Molecular Biology. Rastogi Publication, Meerut.
11. Hartl, D.L. and Jones, E.W. (1000). Genetics – An Analysis of Genes and Genomes. Jones and Bartlett Publishers.
12. Karp, G. (1999). Cell and Molecular Biology – Concepts and Expts. John Wiley and Sons Inc.
13. Kleinsmith, L.J and Kish, V.M. (1995). Principles of Cell and Molecular Biology. Harper Collins College Publishers, NY.
14. Krishna Murphy, K.V. (1000). Methods in Cell Wall Cytochemistry. CRC Press, Boca Raton, Florida.
15. Lewin, B. (1000). Genes VII. Oxford University Press. N.Y.
16. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. (1000) Molecular Cell Biology. W. H. Freeman and Co., NY.
17. Old, R.W. and Primrose, S.B. (1994). Principles of Gene Manipulation. Blackwell Scientific Publication, London.
18. Russel, P.J. (1998). Genetics. Benjamin/Cummings Publishing Co. Inc.
19. Sadava, D. E. (1992). Cell Biology – Organelle Structure and Function. Jones & Barlert Publishers.
20. Snustad, D.P. and Simmons, M.J. (1000). Principles of Genetics. John Wiley and Sons, NY.
21. Stansfield, W.D. (1991). Genetics (Schaums outlines). McGraw Hill.
22. Watson, J.D., Hopkins, N.H., Roberts, J.W., Steitz, J.A. and Weiner, A.M.L. (1987). Molecular Biology of the Gene. The Benjamin/Cummings Publishing Company Inc.

23. Wolfe, S.L. (1993) Molecular and Cellular Biology. Wadsworth Publishing Co. Calfornia, USA.

Laboratory Exercises

1. Isolation of chloroplasts and SDS-PAGE profiles of proteins to demarcate the two subunits of Rubisco.
2. Work out various problems associated with DNA replication process from the given data.
3. Calculation of replication rates from the provided data.
4. Preparation of agarose gel.
5. Isolation of plasmid DNA from an appropriate host by alkali lysis method.
6. Study the effect of some restriction enzymes on DNA.
7. Estimate the molecular weight of different DNA fragments.
8. Study the genic and extragenic inheritance patterns.
9. Isolation of DNA and its quantification.
10. Isolation of DNA and preparation of 'Cot' curve
11. Restriction digestion of plant DNA: its separation by agarose gel electrophoresis and visualization by ethidium bromide staining.

Department of Botany
Offers Following University Wide Courses for students other than Masters in Botany
(2015-2016)

MBOT 175	Ecology, environment and conservation	4	25	25	50	100
MBOT 275	Plants and Human Welfare	4	25	25	50	100

COURSE TITLE: ECOLOGY, ENVIRONMENT AND CONSERVATION

Course No.: MBOT175
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25
ESE: 50

Objective

The course is designed to understand role of plants in setting the environment of the globe. Moreover, this course also educates about the impact of pollution on the plants.

Unit 1: Ecology and Environmental Sustainability

1.1. Ecology: definition, levels of organization, spatial and temporal scales of study.
1.2 Sustainable development: concept, definitions, indicators of sustainable development; goals of sustainable development; sustainable development in India (perspectives and strategies).
1.3 Ecological Restoration: Historical perspective, principles of ecological restoration, terrestrial and aquatic ecosystem restoration; Ecological footprinting-concept, brief history, ecological footprint accounting, applications of ecological footprinting.
1.4 Ecological economics: Ecosystem goods and services; valuation of ecosystem services; payment of ecosystem services (PES); green economics.

Unit 2: Environmental Impact Assessment and Remote Sensing and Geographic Information System.

2.1 EIA: origin and development, purpose and aim.
2.2 EIA process and its components.
2.3 Impact identification methods, EIA in India.
2.4 Remote Sensing and GIS Process, platforms and sensors, remote sensing satellites; systems for data collection; applications of remote sensing and GIS

Unit 3: Natural Resources Degradation and their Management

3.1 Natural resources: types and their degradation.
3.2 Land resources: land distribution and land-use; land degradation-causes, consequences and conservation.
3.3 Water Resources: sources of water, supply, demand, water quality standards in India, water management and conservation.
3.4 Forest Resource: forest cover, deforestation-causes and consequences, forest conservation

Unit 4: Biodiversity: Extent, Loss and Conservation

4.1 Biological biodiversity: concept, levels of biodiversity (genetic, species and ecosystem diversity), uses of biodiversity

4.2 Species diversity: definition, components, global latitudinal species diversity gradient, theories explaining the latitudinal species diversity gradient; ecotone and edge effect.

4.3 Distribution of biodiversity, biodiversity hot spots, mega biodiverse countries, threats to biodiversity, extinction of species, consequences of species loss.

4.4 Biodiversity conservation: Ex situ and In situ conservation strategies, international efforts for conservation biodiversity, biodiversity conservation in India.

Unit 5: Environmental Education and Environmental Laws

5.1 Goals and objectives of Environmental education, environmental educational programmes; environmental education in India.

5.2 Environmental organizations and agencies: International and National bodies; role and relevance.

5.3 Environmental Laws in India: Forest and Wildlife, water, air; International multi-lateral protocols related to Biodiversity Conservation, climate change, stratospheric ozone depletion.

5.4 National Environmental policy; implementation of environmental laws and environmental protection; environmental activism.

Literature recommended

1. Akeroyd, J. and Jackson, P.W. (1995). A Handbook of Botanic Garden and Reintroduction of Plants to the Wild. Botanic garden conservation Union, UK.
2. Chowdhery, H.J. and Murty, S.K. (1000). Plant Diversity and Conservation in India – an overview. Bishen Singh Mahendra Pal Singh, Dehradun.
3. FAO/IBPGR (1989). Technical Guidelines for the Safe Movement of Germplasm. FAO/IBPGR, Rome.
4. Frankel, O.H., Brown, A.H.D. and Burdon, J.J. (1995). The Conservation of Plant Diversity. Cambridge University Press, Cambridge, U.K.
5. Gadgil, M. and Guha, R. (1996). Ecology and Equality: Use and Abuse of Nature in Contemporary India. Penguin, New Delhi.
6. Heywood, V. (1995). Global Biodiversity Assessment. United National Environment Programme. Cambridge University Press, Cambridge, U.K.
7. Haunter, M.L. and Gibbs, J. (1007). Fundamentals of Conservation Biology. 3rd Edn. Blackwell Publishing, U.K.
8. Kothari, A. (1997). Understanding Biodiversity: Life Sustainability and Equity. Orient Longman.
9. Meffe, G.K. and Ronald, C.R. (1994). Principles of Conservation Biology. Sinauer Associates. INC Publishers, USA.
10. Paroda, R.S. and Arora, R.K. (1991). Plant Genetic Resources Conservation and Management. IPGRI Publication. South Asia Office, C/O NBPGR. Pusa Campus, New Delhi.
11. Primack, R.E. (1006). Essentials of Conservation Biology. 4th Edn. Sinauer Associates, U.S.A.
12. Rodgers, N.A. and Panwar, H.S. (1988). Planning a Wildlife Protected Area Network in India. Vol. I. The Report Wildlife Institute of India, Dehradun.

13. Swaminathan, M.S. and Kocchar, S.L. (1989). Plants and Society. MacMillan Publication Ltd., London.
14. Thomas, P. (1000). Trees: their National History. Cambridge University Press, Cambridge.
15. Hemson, E.D. (1981). Understanding evolution, New York Oxford Press.
16. Lull, R.S. (1976). Organic evolution. Light and Life Publishers, New Delhi.
17. Rushforth S.R. (1976). The plant kingdom, evolution and form. Prentice Hall. Inc. New Jersey.
18. Rana S.V.S. and Agrawal V.P. (1985). Enviornment and natural resources. Jenendra Press, Muzaffarnagar.
19. Khoshoo T.N. (1991). Environmental concerns and strategies. Lohra Composing agency, New Delhi.

COURSE TITLE: PLANTS AND HUMAN WELFARE

Course No.: MBOT275
Credit: 4
Duration: 3 hrs
Contact hour per week : 4

Maximum Marks: 100
CIA: 25
MSE: 25

Objectives

This course will prepare students to establish their plant resource based business units. Therefore, the course content involves practices used for growing and maintaining economically important plant species.

Unit-I: Staple food and fodder crops in India

1.1 Essential components of human nutrition; concept of human disorders due to nutritional deficiencies, concept of rabi (wheat) and kharif (rice) crops.
1.2 Cereals- rice and wheat, nutritional value, agro-technology and varieties.
1.3 Legumes- pea and soybean, nutritional value, agro-technology and varieties.
1.4 Fodder crops- types (conserved forage, compound feed, crop residues, freshly cut forage) and their storage.

Unit-II: Fruit and flower crops in India

2.1 Fruits- types, nutritional value, economic importance, preservation and storage.
2.2 Mango and Citrus - agro-technology, varieties and market trends.
2.3 Flowers - economic importance; global floriculture (International scenario and trade); floriculture in India; lifestyle horticulture (hi-tech floriculture; cut flowers, loose flowers, foliage plants, bedding plants, potted plants, bulbous plants, landscape plants, flower seed production, nursery industry, strategies for growth and cultivation of flowering/ornamental plants).

2.4 *Gladiolus* and *Chrysanthemum* – agro-technology and market trends.

Unit-III: Pharmaceutical and perfumery industry based on plants

3.1 Introduction, history of use of MAPs and quality control in medicinal plants.
3.2 Ashwgandha and safed musli - agro-technology, market trends and economics.
3.3 Lemon grass and rose- cultivation, agro-technology and economics.
3.4 Extraction of essential oils (distillation, expression, effleurage, maceration).

Unit-IV : Crops for vegetable oil and sugar

4.1 Composition and uses of vegetable oils (food and medicinal).

4.2 Sunflower and mustard- agro-technology, storage and uses.

4.3 Extraction and refining of vegetable oils (oil expeller, degumming, bleaching and hydrogenation).

4.4 Sugarcane and beet sugar- agro-technology, extraction and economic importance of sugars.

Unit-V: Plant for fibres, natural dyes and paper

5.1 Plant fibres-types; agro-technology (hemp, cotton and *Agave*) and extraction of fibres.

5.2 Natural dyes- types, agro-technology (henna, indigo and safflower) and extraction of dye.

5.3 Dyeing with natural dyes (process, colour combinations, dye recipes- flower, leaves, bark, and roots).

5.4 Paper industry - sources and processes (mechanical and chemical).

Literature recommended:

1. Bedi, Y.S., Dutt, H.C. and Kaur, H. (2011). Plants of Indian System of Medicine (Vol. I &II). Lambert Academic Publishing, Germany.
2. Bose, T.K. and Som, M.G.V. (1986). Vegetable crops in India. Naya Prokash, Calcutta
3. Bose, T.K. (1985). Fruits of India tropical and subtropical. Naya Prokash, Calcutta.
4. Chrispeels, M.J. and Sadava, D.E. (1994). Plants, Genes and Agriculture. Jones and Bartlett Publishers, London
5. Furry S.M. and Viemont V.M. (1935). Home Dyeing with Natural Dyes. Thresh Publications. California
6. Hanson, H. Borlaug N.E. and Anderson, R.G. (1982). Wheat in the Third World. Westbiew Press, Colorado.
7. Jadhav, D. (1009). Medicinal Plants of India. Vol. 1-3. Scientific Publishers, India. NIIR Board (1004).Cultivation of Fruits, Vegetables and Floriculture. NIIR.
8. Jindal, S.L. (1982). Lawns and Gardens. Ministry of Information and Broadcasting, GoI
9. Kent, N.L. (1983). Technology of Cereals. 3rd Edn. Pergamon Press, Oxford.
10. Kochar, S.L. (1009). Economic Botany in the Tropics. 3rd Edn. MacMillan Publishers Ltd.
11. Martin J.H., Leonard, W.H., Stamp, D.L. (1976). Principles of Field Crops. Macmillan Publishers, London.
12. Maiti, R.K. and Singh R.K. (1006). An Introduction to Modern Economic Botany. Agrobios (India).
13. Metcalfse, D.S. and Elkins, D.M. (1980). Crop Production: Principles and Practices (IV ed.). Macmillan Publishing Co. Inc. New York.
14. Pradhan S. (1995). Economic Botany. Har Anand Publication, New Delhi

15. Radhakrishnan, T., Anandaraja, N., Ramasubramanian, M., Nirmala, L. and Israel, M. T. (1009). Traditional Agricultural Practices: Applications and Technical Implementations. New India Publishing, India.
16. Sharma, O.P. (1996). Hill's Economic Botany. Tata McGraw Hill's, Noida.
17. Singh, R. (1969). Fruits. National Book Trust, India.
18. Trivedi, P. (1996). Home Gardening. ICAR, New Delhi
19. Vardhana R. 1009. Economic Botany. Sarup Book Publishers Pvt. Ltd., New Delhi
20. Verma, V. (1009). Textbook of Economic Botany. Ane Books Pvt. Ltd, India.
21. West, R.B. (1999). Practical Gardening in India. Discovery publishing House, New Delhi.

Annexure - 05

Central University of Jammu

22/7, Trikuta Nagar, Jammu

No. CUJ/CE/2014/ 916
Dated: 13/12/2014

The Registrar,
Central University of Jammu,
Jammu

Sir,

Kindly find enclosed herewith the minutes of the meeting and the Scheme and Syllabus of M.Sc Zoology in the department of Animal Sciences and Wildlife.

Thanking You,

Yours Sincerely

13.12.2014

Convener Steering Committee
(Animal Sciences and Wildlife)

15/12/14

Minutes of Meeting of the Steering Committee for Master Degree Programme in Zoology in the department of Animal Sciences and Wildlife held on December 12 & 13, 2014, in the Conference Hall of Central University of Jammu, 22/7, Project Office, Trikuta Nagar, Jammu, at 11:00 AM.

The first meeting of the Steering Committee constituted by the Hon'ble Vice Chancellor to frame the scheme and syllabi of Master Degree Programme in Zoology in the department of Animal Sciences and Wildlife vide Notification No. CUJ/Acad/2014/942-950 dated 09.12.2014 was held in the Conference Hall of Central University of Jammu, Project Office, 22/7, Trikuta Nagar, Jammu on 12/12/2014 and 13/12/2014 at 11.00 AM.

The following members attended the meeting:

1. Prof. Narinder Kumar – Convener
2. Prof. R.K.Sharma – Member
3. Prof. Anish Dua – Member

Prof. Neeta Sehgal could not attend the meeting due to some last minute exigency.

The committee finalized the scheme of different courses to be opted in M.Sc. Zoology comprising Semester I, II, III & IV in the department of Animal Sciences and Wildlife.

The detailed contents of the papers in semester I and II were prepared for the session 2015-16. The scheme and the detailed syllabus contents are attached along as Annexure.

13/12/2014 13.12.2014 13/12/14

Department of Zoology

Central University of Jammu

Course Matrix

M.Sc. Zoology

Semester – I (2015-2016)

Course Code	Paper	Credit	CIA	MSE	ESE	Total
MASZ 101	Structure and Function of Invertebrates	4	25	25	25	100
MASZ 102	Population Genetics & Evolution	4	25	25	50	100
MASZ 103	Fundamentals of Biochemistry	4	25	25	50	100
MASZ 104	Cell & Molecular Biology	4	25	25	50	100
MASZ 151	Lab Course –I	2	-	25	25	50
MASZ 152	Lab Course –II	2	-	25	25	50
	University Wide Elective Course	4	25	25	50	100

Semester – II (2015-2016)

Course Code	Paper	Credit	CIA	MSE	ESE	Total
MASZ 201	Structure and Function of Vertebrates	4	25	25	50	100
MASZ 202	Biosystematics	4	25	25	50	100
MASZ 203	Animal Physiology	4	25	25	50	100
MASZ 204	Vertebrate Immunology	4	25	25	50	100
MASZ 251	Lab Course- III	2	-	25	25	50
MASZ 252	Lab Course- IV	2	-	25	25	50
	University Wide Elective Course	4	25	25	50	100

Semester – III (2016-2017)

Course Code	Paper	Credit	CIA	MSE	ESE	Total
MASZ 301	Fundamentals of Ecology	4	25	25	50	100
MASZ 302	Animal Behaviour & Wildlife	4	25	25	50	100
MASZ 303	Developmental Biology	4	25	25	50	100
MASZ 304	Biotechnology- Concepts & Techniques	4	25	25	50	100
MASZ 351	Lab Course –V	2	-	25	25	50
MASZ 352	Lab Course –VI	2	-	25	25	50
	University Wide Elective Course	4	25	25	50	100

Semester – IV (2016-2017)

Course Code	Paper	Credit	CIA	MSE	ESE	Total
MASZ 401	Parasitology	4	25	25	50	100
MASZ 402	Fish and Fisheries	4	25	25	50	100
MASZ 403	Cytogenetics & Molecular Genetics	4	25	25	50	100
MASZ 404	Environmental Pollution & Toxicology	4	25	25	50	100
	University Wide Elective Course	4	25	25	50	100
MASZ 480	Project Work/Dissertation	4	-	-	-	100

Legends:

CIA: Continuous Internal Assessment
MSE: Mid Semester Exam
ESE: End Semester Exam

*M.Sc. Zoology is offering a total of 16 Core Courses that include Titles like, MASZ 103, 104, 304, 404 that can be grouped/classified as broad Life Sciences courses and hence are parallel to Departmental Elective Courses.

* The Department offers the under mentioned courses as University Wide Elective Courses for the students of other degrees in Semester I, II, III & IV respectively.

MASZ 175 Economic Zoology
MASZ 275 Aquaculture and Fisheries
MASZ 375 Fundamentals of Entomology
MASZ 475 Fish & Wildlife

1st Semester

MASZ 101 Structure and function of Invertebrates

Unit I : Movement and Locomotion

1.1

- 1.1.1 Flagella and Ciliary movement in Protozoa
- 1.1.2 Locomotion based on hydrostatic skeleton, with special reference to Coelenterate, Planaria and Nemertina
- 1.1.3 Functional significance of coelom in locomotion in Echinodermata and Mollusca

1.2 Metamarism and its Significance in movement

Unit II :

2.1 Mechanism of food intake

- 2.1.1 Fluid/liquid feeding
- 2.1.2 Particulate

2.2 Basic digestive mechanisms

- 2.2.1 Ultra-Cellular digestion
- 2.2.2 Extra-Cellular digestion

2.3 Filter Feeding mechanism in:

- 2.3.1 Polychaetes
- 2.3.2 Crustaceans
- 2.3.3 Mollusca

Unit III :

3.1 Respiration – comparative morphology organs in:

- 3.1.1 Branchial
- 3.1.2 Tracheal
- 3.1.3 Pulmonary
- 3.1.4 Cutaneous

3.2 Excretion – comparative study of excretory organs in Invertebrates

3.3 Osmotic & Ionic regulation in Marine, Freshwater and Land animals

3.4 Thermoregulation

Unit IV :

4.1 Primitive nervous system

- 4.1.1 Nerve net in coelenterate
- 4.1.2 Nervous system Echinodermata
- 4.1.3 Nervous system in Hemichordata

4.2 Advanced nervous system

- 4.2.1 Metameric Nervous system in Annelids
- 4.2.2 Nervous system in Anthropods
- 4.2.3 Nervous system in Mollusca

Unit V : Reproductive and larval forms

5.1 Patterns of reproduction

- 5.1.1 Asexual reproduction in invertebrates with special reference to
  - 5.1.1.1 Fission
  - 5.1.1.2 Budding
  - 5.1.1.3 Regeneration
- 5.1.2 General account of sexual reproduction in animals (Invertebrates)

5.2 Larval forms and their functioning in:

- 5.2.1 Crustaceans
- 5.2.2 Insects
- 5.2.3 Echinodermata

Suggested Reading Material

1. Hyman, L.H. The invertebrates, Vol. I. Protozoa through Ctenophora, McGraw Hill Co., New York.
2. Barrington, E.J.W. Invertebrate structure and function. Thomas Nelson and Sons Ltr J. London.
3. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London.
4. Hyman, L.H. The Invertebrates. Vol.2. McGraw Hill Co., New York.
5. Hyman, L.H. The Invertebrates. Vol.8. McGraw Hill. Co., New York.
6. Barnes, R.D. Invertebrate Zoology, IIrd edition. W.B. Saundrs Co., Philadelphia.
7. Russel-Hunter, W.D. A Biology of higher invertebrates, the Macmillin Co. Ltd. London.
8. Hyman, L.H. the Invertebrates smaller coelomate groups, Vol. V. McGraw Hill Co., New York.
9. Read, C.P. Animal Parasitism. Prentice Hall Inc., New Jersey.
10. Sedgwick, A.A. Student text book of Zoology. Vol. I, II and III Central Book Depot, Allahabad
11. Parker, T.J., Haswell, W.A. Text book of Zoology, McMillan Co., London

MASZ 102 - Population Genetics and Evolution

Unit I

1.1 Concepts of evolution and theories of organic evolution with an emphasis on Darwinism.

1.2 Neo Darwinism

1.3 Hardy-Weinberg law of genetic equilibrium

1.4 A detailed account of destabilizing forces:

(i) Natural selection

(ii) Mutation

(iii) Genetic drift

(iv) Migration

(v) Meiotic drive

Unit II

2.1 Quantifying genetic variability

2.2 Genetic structure of natural populations

2.3 Phenotypic variation

2.4 Models explaining changes in genetic structure of populations

2.5 Factors affecting human disease frequency

UNIT III

3.1 Molecular population genetics

3.2 Patterns of change in nucleotide and amino acid sequences

3.3 Ecological significance of molecular variations

3.4 Emergence of Noe-Darwinism-Neutral Hypothesis

3.5 Genetics of quantitative traits in populations

3.6 Analysis of quantitative traits

3.7 Estimation of heritability

3.8 Genotype-environment interactions

3.9 Inbreeding depression and heterosis

3.10 Molecular analysis of quantitative traits

3.11 Phenotypic plasticity

Unit IV

4.1 Genetics of speciation

4.2 Concept of species

4.3 Patterns and mechanisms of reproductive isolation

4.4 Modes of speciation (Allopatric, sympatric, parapatric, peripatric)16

4.5 Molecular Evolution

4.6 Gene Evolution

4.7 Evolution of gene families, Molecular drive

4.8 Assessment of molecular variation

Unit V

5.1 Origin of higher categories

5.2 Phylogenetic gradualism and punctuated equilibrium

5.3 Major trends in the origin of higher categories

5.4 Micro-and Macro-evolution

5.5 Molecular phylogenetics

5.6 Concept of phylogenetic trees.

5.7 Methods of construction of Phylogenetic trees.

Suggested Reading Material

1. Dobzhansky, Th. Genetics and Origin of Species. Columbia University Press. Dobzhansky, Th., F.J. Ayala, G.L. Stebbines and J.M. Valentine. Evolution. Surjeet Publication, Delhi.
2. Futuyama, D.J. Evolutinary Biology, Suinuaer Associates, INC Publishers, Dunderland.
3. Hartl, D.L. A Primer of Population Genetics. Sinauer Associates, Inc, Massachusetts.
4. Jha. A.P. Genes and Evolution. John Publication, New Delhi.
5. King, M. Species Evolution-The role of chromosomal change. The Cambridge University Press, Cambridge.
6. Merrel, D.J. Evolution and Genetics. Holt, Rinehart and Winston, Inc.
7. Smith, J.M. Evolutinary Gentics. Oxford Universit Press, New York.
8. Strickberger, M.W. Evolution. Jones and Bartett Publishers, Boston London.

MASZ 103 Fundamentals of Biochemistry

Unit I

1.1 General Principles of Biochemistry and chemical composition of life.

1.2 Glycolysis, citric acid cycles its regulation and role as metabolic hub Gluconeogenesis, Glycogenolysis

1.3 Hexose monophosphate pathway its regulation and significance.

Unit II

2.1 Cholesterol biosynthesis, its metabolism steroid genesis, Bile acids and their metabolism, altered cholesterol levels

2.2 Saturated and unsaturated fatty acid and their metabolism

2.3 Primary, Secondary, tertiary and quaternary structure of proteins (Domain, Reverse turn of Ramachandran plot).

Unit III

3.1 Enzyme : classification and nomenclature, co-enzymes, induced fit and Molecular Mechanism of Enzyme action, Enzyme feedback mechanism, Isozymes.

3.2 DNA, RNA, structure and functions, DNA chroeography.

Unit IV

4.1 Principles and uses of analytical instruments: Spectrophotometers, NMR spectrophotometer, ultra centrifuge, Types of Microscopes.

4.2 Cryotechniques :Cryopreservation for cells, tissue, organisms.

Unit V

5.1 Separation techniques in biology. Molecular separations by chromatography, electrophoresis, precipitation etc.

5.2 Organelle separation by centrifugation.

5.3 Cell separation by flow cytometery, density gradient centrifugation, unit gravity centrifugation, affinity adsorption, anchorage based techniques etc.

Suggested Reading Materials:

1. Animal Cell Culture – A practical approach, Ed. John R.W. Masters, IRL Press.
2. Introduction to Instrumental analysis, Robert Braun, McGraw Hill International editions
3. A Biologists guide to Principles and Techniques of Practical Biochemistry, K. Wilson and K.H. Goulding, ELBS Edn.

MASZ 104 Cell & Molecular Biology

UNIT I

1.1 Biomembranes
1.2 Molecular composition and arrangement, functional consequences.
1.3 Transport – Recapitulation of the plasma membrane; diffusion, active transport and pumps, uniports, symports and antiports.
1.4 Donnan equilibrium; ion movements and cell function: acidification of cell organelles and stomach
1.5 Maintenance of cellular pH; cell excitation; bulk transport; Receptor mediated endocytosis
1.6 Transepithelial transport
1.7 Cytoskeleton and cell movement
- 1.7.1 Structure and organization of actin filaments
- 1.7.2 Actin, myosin and cell movements
- 1.7.3 Structure and dynamic organizations of microtubules
- 1.7.4 Microtubule motors and movement
- 1.7.5 Intermediate filaments
- 1.7.6 Cilia and flagella

UNIT II

2.1 The Extra Cellular Matrix and Cell interactions
2.2 Cell walls
2.3 The ECM and cell-matrix interactions
2.4 Cell-cell interactions: adhesion junctions, tight junctions, gap junctions, Plasmodesmata
2.5 Ca++ dependent and Ca++ independent Homophilic cell-cell adhesion
2.6 Cell matrix adhesion
2.7 Integrins
2.8 Collagen
2.9 Non-collagen components
2.10 Auxin and cell expansion
2.11 Cellulose fibril synthesis and orientation

UNIT III

3.1 Protein sorting and transport
3.2 Protein uptake into the ER
3.3 Membrane proteins and Golgi sorting
3.4 Mechanism of vesicular transport
3.5 Lysosomes
3.6 Molecular mechanism of secretory pathway2

3.7 Cell cycle
3.7.1 The eukaryotic cell cycle
3.7.2 Regulators of cell cycle progression
3.7.3 The events of M phase
3.8 Meiosis and fertilization

UNIT IV

4.1 Genome organization
4.2 Chromosomal organization of genes and non-coding DNA
4.3 Mobile DNA
4.4 Morphological and functional elements of eukaryotic chromosomes
4.5 Cell – Cell signaling
4.6 Signaling molecules and their receptors
4.7 Function of cell surface receptors
4.8 Pathways of intracellular signal transduction
4.9 Signaling networks
4.10 Cell death and cell renewal
4.11 Programmed cell death
4.12 Stem cells and the maintenance of adult tissues
4.13 Embryonic stem cells and therapeutic cloning

UNIT V

5.1 Biology of Cancer
5.2 The development and causes of cancer
5.3 Oncogenes
5.4 Tumor suppressor genes
5.5 Molecular approaches to cancer treatment
5.6 Biology of Ageing

Suggested Reading Material

1. Molecular Cell, Biology, J. Darnell, H. Lodish and D. Baltimore Scientific American Book, Inc., USA.
2. Molecular Biology of the Cell, B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson. Garland Publishing Inc., New York.

MASZ 151 Lab Course I & MASZ 152 Lab Course II

The lab course I & II are based on the course contents of the papers titled (MASZ 101, 102) &(MASZ 103 & 104) respectively. The practical exercises shall be as per the prescribed national guidelines (UGC guidelines, Dissection Monitoring Committee approval) and are based on the available resources that are live material and/or e-resources.

MASZ 175 – Economics Zoology

Unit I : AQUACULTURE

1.1 Prawn culture

1.2 Pearl Industries and mode of Pearl Formation

1.3 Composite Aquaculture

- 1.3.1 Composite Fish culture
- 1.3.2 Trout culture
- 1.3.3 Carp culture
- 1.3.4 Economically Important fresh water food fishes in India
- 1.3.5 Induced Breeding (Spawning Technique)
- 1.3.6 Duck / Goose Culture

Unit II : APICULTURE SERICULTURE LAC CULTURE

2.1 **Apiculture** :

- 2.1.1 General morphology of honey bees, laying special stress on mouth parts and appendages of workers

2.2 **Honey Bee**:

- 2.2.1 Life cycle of Honey bee
- 2.2.2 Uses of honey & Bee – Wax; composition of honey
- 2.2.3 Methods uses in Apiculture
- 2.2.4 Enemies (Predators and Parasites) of honey bee
- 2.2.5 Bee venom as medicine

2.3 **Sericulture**:

- 2.3.1 Life Cycle of silk work
- 2.3.2 Silk Producing insect in India and Kinds of Silk fibers produced
- 2.3.3 Economic Importance of Silk work
- 2.3.4 Mulberry cultivation for sericulture
- 2.3.5 Principles of silk worm rearing
- 2.3.6 Pebrine Disease, Its Genesis Pathogenesis And Prophylaxis

2.4 **Lac Culture:**

- 2.4.1 Life Cycle of Lac Insect
- 2.4.2 Lac Cultivation, Formation and Uses

Unit III : Poultry and cattle farming :

3.1 **Poultry farming**

3.1.1 Breeds of Poultry birds : their characteristics Rhode island red white - Leghorn, Black Minorca, Ased, Chittagong

3.1.2 Poultry breeding and rearing

3.1.3 Poultry feed and quality food

3.1.4 Poultry diseases such as Ranikhet, Coccidiosis Avian

3.2 **Cattle Farming**

3.2.1 Breeds of diary cattle and their characteristics Red sindhi sahiwal, Red Dane Haryana, holstien – Friesian Jersy

3.2.2 Feeding and fodder

3.2.3 Cattle diseases : mastitis, anthrax, Foots mouth diseases

3.2.4 Wool industry including rabbits wool

3.2.5 Integrated animal farming

Unit IV : Animal Pests

4.1 Nematode parasite of potato, tomato and wheat.

4.2 Insect Pests :

4.2.1 Insect Pests of stored food, diagnostic Features extent of damage control

4.2.1.1 *Sitophilous oryze* (Rice -- Weavil)

4.2.1.2 *Tribolium castenum* (red flour beetle)

4.2.1.3 *Rhizopertha dominica*

4.3 Insect Pests of standing crops

4.3.1 Leptocorsia vericornis (Rice – Gundhi Bug)

4.3.2 Pectinophora gossypiella (Pink -- boll worm of Cotton)

4.3.3 Diacrisia Obliqae (Bihar – hairy Caterpillar)

4.4 Insects as vectors of human diseases

4.5 Tick and mite their harms role and control (Self Study)

4.6 Snakes

4.6.1 Poisonous snakes and venom

4.6.2 Role of snake in rodent pest control

4.7 Birds :

4.7.1 Birds as pest

4.7.2 Role of snakes in rodent pest control

Unit V

5.1 General concepts of biotechnology

5.2 Biotechnology in live stock :

- 5.2.1 in-virto fertilization
- 5.2.2 Artificial insemination
- 5.2.3 Surrogate mothers : cmbryo transfer technology
- 5.2.4 Cloning (basic concept)

5.3 Application of biotechnology

- 5.3.1 Biogas (Self Study)
- 5.3.2 Biofertilizers
- 5.3.3 Bioinsecticides
- 5.3.4 Antibiotics

Suggested Reading Material

1. Singh V P and Ramashandran, V (1985), Fresh Water fish culture ICAR, New Delhi
2. Stickney, R R (1979) Principle of warm water aquaculture, John Willey & Sons New Delhi
3. Jhingan, CP (1982) Fish and Fisheries of India Hindustan Pub. Corp. (India) New Delhi
4. Kurian C V and Sebastian V C, Prawns and prawn Fisheries of India Hundustan Publ Corp (India) New Delhi
5. Banerjee, G C (1982), Poultry, Oxford and IBM Publ.
6. Matcalf C.L. and Flint, W.P. Useful and destructive insects. Tata McGraw hill Publ. New Delhi
7. Shukla and Upadhya Economic Zoology
8. Kovaleve, P.A. Silkworm breeding stocks Central Silk Braod, Marine, Drive Bombay
9. Roger, A Morse, The ABC and XYZ of Bee Culture A.I. Root & Co Medina, Ohia.

SEMESTER II

Course MASZ 201 – Structure and Function of Vertebrates

Unit I

1.1 Chordates – Origin of chordates

1.2 General characters and classification of chordates upto class level.

1.3 Hemichordata

- 1.3.1 External morphology of Balanoglossus
- 1.3.2 Affinities and systematic position of Balanoglossus

1.4 Urochordata (type:Herdmania)

- 1.4.1 External morphology
- 1.4.2 Digestive system
- 1.4.3 Circulatory system
- 1.4.4 Reproductive system

1.5 Cephalochordata (type:Amphioxus)

- 1.5.1 External morphology
- 1.5.2 Digestive system
- 1.5.3 Circulatory system
- 1.5.4 Nervous system
- 1.5.5 Affinities of Amphioxus (self study)

Unit II Agnatha and pisces

2.1 General characters and outline classification of Agnatha and Pisces upto order level.

2.2 Type : Petromyzon

- 2.2.1 External features (self study)
- 2.2.2 Digestive systems and feeding
- 2.2.3 Reproductive system and Ammocoetus larva along with economic importance

2.3 Type: Scoliodon

- 2.3.1 External characters (self study)
- 2.3.2 Digestive system
- 2.3.3 Respiratory system
- 2.3.4 Urinogenital system
- 2.3.5 Central nervous system

Unit III Amphibians and Reptiles

3.1 General characters and classification of amphibians and reptiles upto order level.

3.2 Amphibia (type: Frog)

- 3.2.1 External features (self study)
- 3.2.2 Digestive system
- 3.2.3 Respiratory system
- 3.2.4 Circulatory system
- 3.2.5 Urinogenital system
- 3.2.6 Central nervous system

3.3 Reptile (Type: Calotes)

- 3.3.1 External features (self study)
- 3.3.2 Digestive system
- 3.3.3 Respiratory system
- 3.3.4 Circulatory system
- 3.3.5 Urinogenital system
- 3.3.6 Central nervous system

Unit IV Aves and Mammalia

4.1 General characters and classification of Aves and Mammalia upto order level.

4.2 Amphibia (type: Pigeon)

- 4.2.1 External features (self study)
- 4.2.2 Digestive system
- 4.2.3 Respiratory system
- 4.2.4 Circulatory system
- 4.2.5 Urinogenital system
- 4.2.6 Central nervous system

4.3 Types of feathers in birds

4.4 Types of beaks in birds

4.5 Types of feet and claws in birds

4.6 Mammalia (type: Rabbit)

- 4.6.1 External features (self study)
- 4.6.2 Digestive system
- 4.6.3 Respiratory system
- 4.6.4 Circulatory system
- 4.6.5 Urinogenital system
- 4.6.6 Central nervous system

Unit V

5.1 Types of scales and fins in fishes

5.2 Migration and parental care in fishes

5.3 Parental care in amphibians

5.4 Migration of birds

5.5 Flight adaptation in birds

5.6 A brief account of extinct reptiles

5.7 Skin, its derivatives and uses (hair and glands), Horns, digital tips and antlers in mammals (self study)

5.8 Jaw suspension in vertebrates.

Suggested Reading Material

1. Barrington, E.J.W. The Biology of Hemichordata and Protochordata. Oliver and Boyd, Edinbourgh.
2. Bourne, G.H. The structure and functions of nervous tissue. Academic Press, New York.
3. Carter, G.S. Structure and habit in vertebrate evolution - Sedgwick and Jackson, London.
4. Kingsley, J.S. Outlines of Comparative Autonomy of Vertebrates. Central Book Depot, Allahabad.
5. Kent, C.G. Comparative anatomy of vertebrates.
6. Milton Hilderbrand. Analysis of vertebrate structure. IV. Ed. John Wiley and Sons Inc., New York.
7. Sedgwick, A. A Students Text Book of Zoology, Vol. II.
8. Torrey, T.W. Morphogenesis of vertebrates. John Wiley and Sons Inc., New York and London.
9. Walters, [illegible] Biology of vertebrates. MacMillan & Co., New York.
10. Weichert, C.K. and Presch, W. Elements of chordate anatomy, 4th Edn. McGraw Hall Book Co., New York.
11. Messers, H.M. An introduction of vertebrates anatomy.
12. Montagna, W. Comparative anatomy. John Wiley and Sons Inc.
13 Andrews, S.M. Problems in vertebrate evolution. Academic Press, New York.

MASZ202 Biosystematics

UNIT I

1.1 Definition and basic concepts of biosystematics and taxonomy.
1.2 Historical resume, Importance and applications of systematic in biology.
1.3 Trends in biosystematics – concepts of different conventional and newer aspects
1.4 Chemotaxonomy
1.5 Cyotaxonomy
1.6 Molecular taxonomy

UNIT II

2.1 Dimensions of speciation and taxonomic characters
2.2 Species concepts – species category, different species concepts; sub-species and other intra-specific categories.
2.3 Theories of biological classification, hierarchy of categories.
2.4 Taxonomic characters – different kinds, weighing of characters

UNIT III

3.1 Methodology
3.2 Taxonomic collections, preservation, curetting process and identification.
3.3 Taxonomic keys-different kinds of taxonomic keys, their merits and demerits.
3.4 Systematic publications – different kinds of publications.

UNIT IV

4. International code of Zoological Nomenclature (ICZN) – its operative principles and interpretation of the following :Stability, Priority, Concept of availability, formation of names, synonymy, homonymy, the type method, kinds of type specimen, type-designation

UNIT V

5.1 Evaluation of biodiversity indices
5.2 Shannon-Weiner index, dominance index
5.3 Similarity and dissimilarity index
5.4 Association index

Course MASZ 203 - Animal Physiology

Unit I

1.1 Modes of animal nutrition, Digestion of carbohydrates, proteins, and lipids their endocrine control

1.2 Blood : Composition and functions, Blood coagulation, Blood groups and transfusion, Buffer system, Heart and its working, Heart beat, Origin, rhythmicity and conduction, Nervous regulation, Chemical regulation, Electro-cardiogram, Cardiac cycle in man, The exchange vessels

Unit II

2.1 Respiratory Physiology

2.2 Nervous regulation of respiration (in mammals), Physiological adaptations to different environments, Environmental influences over respiratory process (in mammals),Extreme temperature & limits to life, Tolerance to cold and freezing, Tolerance to high temperature

2.3 Detailed structure of nephron, Glomerular functions, Tubular functions, The rennin angiotens, Aldosterone system

Unit III

3.1 Muscle contraction striated muscles

3.2 Sliding, filament theory and cross bridges activity, Cross-bridge attachment and muscle contraction, Energy cycle, role of ATP,

3.3 Neurophysiology, Nerve cell organization, Nerve impulse origin and propagation, Synapsis and transmitters

Unit IV

4.1 Basic concept of endocrinology, its scope and role in molecular biology.

4.2 Chemical nature of hormones; Amino-acid derived hormones Peptide hormones Glyco - protein hormones, Steroid hormones and Prostaglandin

4.3 Biosynthesis of peptide hormones. transcriptional and post-transcriptional modifications.

4.4 Network of extra-cellular and intracellular signals. Role of cell structure in intracellular communication.

4.5 Prostaglandin structure, type, synthesis and biological activities.

Unit V

5.1 Mechanism of action of peptide hormones; concept of second messengers, cAMP, cFMP, Ca++, calmoduline, IP3 , DAG, NO, signal transduction mechanism, G-proteins.

5.2 Mechanism of action of steroid hormones; Nuclear receptors, orphan genes and receptors and their role in metabolism and development. Cross talk concept, phosphorylation, Heat shock proteins.

Suggested Reading Material

1. C.L. Prosser. Comparative Animal Physiology. W.B. Saunders & Company.
2. R.Eckert. Animal Physiology: Mechanisms and Adaptation. W.H. Freeman & Company.
3. W.S. Hoar. General and Comparative Animal Physiology
4. Schiemdt-Nielsen. Animal Physiology: Adaptation and Environment. Cambridge.
5. C.L. Prosser. Environment and Metabolic Physiology. Wiley-Liss, New York.

MASZ 204 – Vertebrate Immunology

Unit I

1.1 Innate and Acquired Immunity

1.2 Phylogeny and Ontogeny of immune system

1.3 Organization and structure of lymphoid organs Cells of the immune system and their differentiation Lymphocyte traffic

1.4 Nature of immune response

1.5 Nature of antigens and superantigens

1.6 Antigenicity and immunogenicity Factors influencing immunogenicity Epitopes and haptens

Unit II

2.1 Structure and Functions of Antibodies

- 2.1.1 Classes and subclasses
- 2.1.2 Gross and Fine structure
- 2.1.3 Antibody mediated effector functions

2.2 Antigen-Ab interactions in vitro and in vivo

2.3 Complement System

Unit III

3.1 Major Histocompatibility Complex in mouse and HLA system in human

- 3.1.1 MHC haplotypes
- 3.1.2 Class I and class II molecules
- 3.1.3 Cellular distribution
- 3.1.4 Peptide binding
- 3.1.5 Expression and diversity
- 3.1.6 Disease susceptibility and MHA/HLA

Unit IV

4.1 Organization and expression of Ig genes

- 4.1.1 Models for Ig gene structure
- 4.1.2 Multigene organization of Ig genes
- 4.1.3 DNA rearrangements and mechanisms
- 4.1.4 Generation of antibody diversity
- 4.1.5 Differential expression of Ig genes

4.2 T-cell receptors

- 4.2.1 Isolation, molecular components and structure
- 4.2.2 T-cell maturation and thymus
- 4.2.3 T H-cell activation mechanism
- 4.2.4 T-cell differentiation
- 4.2.5 Cell death and T-cell population

4.3 B-cell generation, activation and differentiation

4.3.1 B-cell receptors
4.3.2 Selection of immature self-reactive B-cells
4.3.3 B-cell activation and proliferation
4.3.4 T H-B-Cell interactions
4.3.5 Humoral immune response-kinetics

Unit V

5.1 Cytokines
5.1.1 Structures and functions
5.1.2 Cytokine receptors
5.1.2 Cytokine and Immune response
5.2 Cell-mediated effector functions
5.2.1 Cell adhesion molecules
5.2.2 Effector cells and molecules
5.2.3 CTL and NK cells-mechanisms of action
5.2.4 Delayed type hypersensitivity
5.3 Immunological tolerance and Anti-immunity
5.4 Hypersensitivity and immune responses to infection agents especially intracellular parasites.

Suggested Reading Material

1. Kuby. Immunology, W.H. Freeman, USA.

2. W. Paul. Fundamentals of Immunology.

3. I.M. Roitt. Essential Immunology, ELBS Edition.

MASZ 251 Lab Course I & MASZ 252 Lab Course II

The lab course I & II are based on the course contents of the papers titled (MASZ 201, 202) & (MASZ 203 & 204) respectively. The practical exercises shall be as per the prescribed national guidelines (UGC guidelines, Dissection Monitoring Committee approval) and are based on the available resources that are live material and/or e-resources

MASZ 275 Aquaculture and Fisheries

Unit I

1.1 Introduction to freshwater, estuarine, and marine ecosystems
1.2 Lentic and lotic water bodies
1.3 Water-quality parameters of aquatic ecosystems
1.4 Biotic communities in aquatic ecosystems- plankton, periphyton, nekton, neuston and benthos
1.5 Primary and secondary productivity in aquatic ecosystems
1.6 Special aquatic habitats- polar and alpine lakes, salt lakes, special stream environments

Unit II

2.1 General classification of fishes
2.2 External morphology of fish
2.3 Age and growth in fishes
2.4 Population dynamics in fishes and methods of estimating fish populations
2.5 [illegible]ishes
2.6 Adaptations in deep sea and hill stream fishes

Unit III

3.1 Inland fisheries resources- Ganga River System, Brahmputra River System, East Cost River System, West Coast River System, Indus River System
3.2 Lake and reservoir fisheries
3.3 Principal estuarine fisheries
3.4 Principal marine fisheries
3.5 Fishing nets and gears
3.6 Aquatic pollution and its effects on fisheries

Unit IV

4.1 Scope and importance of fish culture
4.2 Fish farming practices
4.3 Culturable fishes
4.4 Components and establishment of a fish farm
4.5 Management of fish ponds
4.6 Water-quality criteria for fish farming
4.7 Breeding and seed production of culturable fishes
4.8 Common fish diseases and their treatment
4.9 Harvesting, and marketing fishes

Unit V

5.1 Synoptic study of:
- 5.1.1 Prawn farming
- 5.1.2 Ornamental fish farming
- 5.1.3 Pearl culture
- 5.1.4 Seaweed Culture
- 5.1.5 Paddy-cum-fish culture

5.2 Fish processing and value addition

5.3 Introduction to aquaculture biotechnology
5.4 Environmental impacts of aquaculture and Fisheries

Suggested Readings

1. Chonder, S.L. A Hand Book of Breeding of Indian Major Carps
2. Day, F. Freshwater Fishes of India, Burma and Ceylon
3. Hickling, C.P. Tropical Inland Fisheries
4. Hora, S.L. and Mookerjee, D.D. Identification of Freshwater Fishes
5. Jhingran, V.G. Fish and Fisheries of India
6. Kurian, C.V. and Sebastian, V.G. Prawn and Prawn Fisheries of India
7. Nikolsky, G.V. The Ecology of Fishes
8. Pillay, T.V.R. Principles of Warm Water Aquaculture
9. Pillay, T.V.R. Aquaculture and Environment

Annexure - 07

पंजीकरण संख्या
Registration no

अनुक्रमांक
Roll No

जम्मू केंद्रीय विश्वविद्यालय

Central University Of Jammu

प्रमाणित किया जाता है कि .....पुत्र/पुत्री.....(पिता) .....

(माता) ....विभाग .....स्कूल से

कला निष्णात

उपाधि के लिए निर्धारित पाठ्यक्रम का अध्ययन ....विषय में पूरा किया एवं विश्वविद्यालय द्वारा वर्ष .....में आयोजित अंतिम परीक्षा में सूत्री पैमाने में संचयी ग्रेड बिंदु औसत प्रणाली में.....के साथ उत्तीर्ण किया ।

This is to certify that ....

Son/daughter of .....(Father)..... ....(Mother)

of the Department of ....

School of ....

has been admitted to the Degree of

Master of Arts

having successfully completed the prescribed course of study in the subject of ..... *and qualified the Final Examination held in this University, in the year* ..... *with Cummulative Grade Point Average of* ..... *in the 07 point scale.*

दिनांक
Dated.....

परीक्षा नियंत्रक
Controller of Examinations

कुलपति
Vice Chancellor

Annexure - 08

पंजीकरण संख्या
Registration no

अनुक्रमांक
Roli No

जम्मू केंद्रीय विश्वविद्यालय

Central University Of Jammu

प्रमाणित किया जाता है कि .....पुत्र/पत्री.....(पिता) .....

(माता) .... विभाग ..... स्कूल से

विज्ञान निष्णात

उपाधि के लिए निर्धारित पाठ्यक्रम का अध्ययन ....विषय में पूरा किया एवं विश्वविद्यालय द्वारा वर्ष .....में आयोजित अंतिम परीक्षा में 07 सूत्री पैमाने में संचयी ग्रेड बिंदु औसत प्रणाली में.....के साथ उत्तीर्ण किया ।

This is to certify that .....

Son/daughter of ....(Father)..... ....(Mother)

Of the Department of ....

School of ....

has been admitted to the Degree of

Master of Science

having successfully completed the prescribed course of study in the subject of ..... and qualified the Final Examination held in this University, in the year ..... with Cumulative Grade Point Average of ..... in the 07 point scale.

दिनांक
Dated.....

परीक्षा नियंत्रक
Controller of Examinations

कुलपति
Vice Chancellor

Annexure - 09

पंजीकरण संख्या
Registration no

अनुक्रमांक
Roll No

जम्मू केंद्रीय विश्वविद्यालय

Central University Of Jammu

प्रमाणित किया जाता है कि .....पुत्र/पुत्री..... (पिता) .....
(माता)..... ..... विभाग ..... स्कूल से

कंप्यूटर अनुप्रयोग निष्णात

उपाधि के लिए निर्धारित पाठ्यक्रम का अध्ययन ....विषय
में पूरा किया एवं विश्वविद्यालय द्वारा उसे .....में आयोजित अंतिम परीक्षा में 07 सूत्री पैमाने में एंत्यी ग्रेड बिंदु
औसत प्रणाली में.....के साथ उत्तीर्ण किया ।

This is to certify that ....
Son/daughter of .....(Father)..... ....(Mother)
Of the Department of ....
School of ....

Master of Computer Application (MCA)

having successfully completed the prescribed course of study in the subject of ..... and qualified the Final Examination held in this University, in the year ..... with Cummulative Grade Point Average of ..... in the 07 point scale.

दिनांक
Dated.....

परीक्षा नियंत्रक
Controller of Examinations

कुलपति
Vice Chancellor

Annexure - 10

पंजीकरण संख्या
Registration no

अनुक्रमांक
Roll No

जम्मू केंद्रीय विश्वविद्यालय

Central University Of Jammu

प्रमाणित किया जाता है कि .....पुत्र/पुत्री..... (पिता) .....

(माता) .... विभाग के .....विद्यालय से

व्यवासय प्रशासन निष्णात

(पर्यटन एवं यात्रा प्रबंधन)

उपाधि के लिए निधारित पाद्यक्रम का अध्ययन ....
विषय मे पूरा किया एवं विश्वविद्यालय द्वारा वर्ष .....में आयोजित अंतिम परीक्षा में 07 सूत्री पैमाने में संचयी ग्रेड बिंदु औसत प्रणाली में.....के साथ उत्तीर्ण किया ।

This is to certify that ....

Son/daughter of ....(Father)..... ....(Mother)

Of the Department of ....

School of ....

Master of Business Administration
(Tourism and Travel Management)

having successfully completed the prescribed course of study in the subject of ..... *and qualified the Final Examination held in this University, in the year* ..... *with Cummulative Grade Point Average of*..... *in the 07 point scale.*

दिनांक
Dated.....

परीक्षा नियंत्रक
Controller of Examinations

कुलपति
Vice Chancellor

Annexure - 11

पंजीकरण संख्या
Registration no

अनुक्रमांक
Roll No

जम्मू केंद्रीय विश्वविद्यालय

Central University Of Jammu

प्रमाणित किया जाता है कि .....पुत्र/पुत्री..... (पिता) .....

(माता) .... विभाग के .....विद्यालय से

व्यवासय प्रशासन में निष्णात

(मानव संसाधन प्रबंधन)

उपाधि के लिए निर्धारित पाठ्यक्रम का अध्ययन ....

विषय में पूरा किया एवं विश्वविद्यालय द्वारा वर्ष .....में आयोजित अंतिम परीक्षा में 07 सूत्री पैमाने में संचयी ग्रेड बिंदु औसत प्रणाली में.....के साथ उत्तीर्ण किया ।

This is to certify that .....

Son/daughter of .....(Father)..... .....(Mother)

Of the Department of ....

School of ....

Master of Business Administration
(Human Resource Management)

having successfully completed the prescribed course of study in the subject of ..... and qualified the Final Examination held in this University, in the year ..... with Cummulative Grade Point Average of..... in the 07 point scale.

दिनांक
Dated.....

परीक्षा नियंत्रक
Controller of Examinations

कुलपति
Vice Chancellor

Annexure - 12

पंजीकरण संख्या
Registration no

अनुक्रमांक
Roll No

जम्मू केंद्रीय विश्वविद्यालय

Central University Of Jammu

प्रमाणित किया जाता है कि .....पुत्र/पत्री.....(पिता) .....

(माता) .... विभाग ..... स्कूल से

शिक्षा निष्णात

उपाधि के लिए निर्धारित पाठ्यक्रम का अध्ययन ....विषय
मे पूरा किया एवं विश्वविद्यालय द्वारा वर्ष .....में आयोजित अंतिम परीक्षा में 07 सूत्री पैमाने में संचयी ग्रेड बिंदु
औसत प्रणाली में.....के साथ उत्तीर्ण किया ।

This is to certify that ....

Son/daughter of ....(Father)..... ....(Mother)

Of the Department of ....

School of ....

Master of Education (M.Ed.)

having successfully completed the prescribed course of study in the subject of ..... and qualified the Final Examination held in this University, in the year ..... with Cummulative Grade Point Average of ..... in the 07 point scale.

दिनांक	परीक्षा नियंत्रक	कुलपति
Dated.....	Controller of Examinations	Vice Chancellor

Annexure - 13

पंजीकरण संख्या
Registration no

अनुक्रमांक
Roll No

जम्मू केंद्रीय विश्वविद्यालय

Central University Of Jammu

प्रमाणित किया जाता है कि .....पुत्र/पुत्री..... (पिता) .....(माता)
.... विभाग मे .....स्कूल मे

दर्शन निष्णात

उपाधि के लिए निर्धारित पाठ्यक्रम का अध्ययन ....
विषय में पूरा किया एवं विश्वविद्यालय द्वारा वर्ष .....में आयोजित अंतिम परीक्षा में 07 सूत्री पैमाने में संचयी ग्रेड बिंदु औसत प्रणाली में.....के साथ उत्तीर्ण किया ।

This is to certify that .....
Son/daughter of .....(Father)..... .....(Mother)
Of the Department of ....
School of ....

Master of Philosophy

having successfully completed the prescribed course of study in the subject of ..... in the year ..... with Cummulative Grade Point Average of ..... in the 07 point scale.

दिनांक	परीक्षा नियंत्रक	कुलपति
Dated.....	Controller of Examinations	Vice Chancellor

Annexure - 14

जम्मू केंद्रीय विश्वविद्यालय

Central University Of Jammu

पंजीकरण संख्या
Registration no

अनुक्रमांक
Roll No

प्रमाणित किया जाता है कि .....पुत्र/पुत्री..... (पिता) .....

(माता) .... विभाग .....स्कूल में

विद्यावाचस्पति

उपाधि के लिए एकीकृत एम.फिल – विद्यावाचस्पति कार्यक्रम के लिए निर्धारित विषय को स्वीकृत किए जाने के बाद अपना शोध प्रबंध ..... विभाग में सफलतापूर्वक उत्तीर्ण किया ।

शोध प्रबंध का विषय .....

.....

This is to certify that ....

son/daughter of ....(Father)..... ....(Mother)

of the Department of ....

School of ....

Doctor of Philosophy

having successfully completed the prescribed course of study in the Integrated M. Phil - Ph. D Programme after approval of his/her thesis in the subject of .....

Topic of thesis—————————————————————————————

———————————————

दिनांक	परीक्षा नियंत्रक	कुलपति
Dated.....	Controller of Examinations	Vice Chancellor

Annexure - 15

DEPARTMENT OF TOURISM AND TRAVEL MANAGEMENT
CENTRAL UNIVERSITY OF JAMMU

No: CUJ/TAB/TTM/147
Dated: 15-12-2014

The Registrar
Central University of Jammu
Jammu

Sir,

It is for your kind information that the Faculty of Business Studies would like to start part time Ph.d in the school. The matter has been already discussed in the Dean's Meeting held on 11-09-2014(copy enclosed).The Business school is already running the Integrated M.Phil -Ph.D Programme and is well equipped to start the part time Ph.d as well.

Thanking You

Yours Sincerely,

15-12-2014

(Prof.Deepak Raj Gupta)
Dean, School of Business Studies

Central University of Jammu

Minutes of Dean's Meeting held at TAB on 11-09-2014

The following were present in the meeting:

1. Prof. Deepak Raj Gupta (In the chair) 11-9-14
2. Prof. H.S. Sehgal 11.9.14
3. Prof. Nandini Bhattacharya 11.9.14
4. Prof. Y. Parthasaradhi
5. Prof. N.R. Sharma
6. Dr. P.S. Pathania
7. Prof. Shyam Singh

A meeting of the Deans was held on 11-09-14 at 3.30PM to deliberate the issue of starting Part-time Ph.D. Programme in the Departments other than the Departments of National Security and Studies and Public Policy and Public Administration wherein, on the basis of the ordinance of the University, Part-time Ph.D. Programme had already been started.

After threadbare discussion on the issue it was unanimously decided that Part-time Ph.D. may be started in the Department that is willing to start as per the ordinance pertaining to the Part time Ph.D. Programme.

The concerned Dean may draw the proposal for starting the Part time Ph.D. in the current session and submit the same to the Competent Authority for their consideration and approval.

11-9-2014.

(Prof. Deepak Raj Gupta)
Academic Administrator

Annexure - 16

Central University of Jammu
Department of Computer Science & I.T

The Department of Computer Science and Information Technology wants to start Integrated M.Phil-Ph.D and part-time Ph.D programmes from the Session 2015-16. It is requested that necessary permission may kindly be granted.

Head
Department of Computer Science
Central University of Jammu
Jammu

Dean
(School of Basic & Applied Sciences)

Registrar

Annexure - 17

CENTRAL UNIVERSITY OF JAMMU

8/8, Trikuta Nagar, Jammu (J&K) INDIA

Note :

Subject: Agenda for Academic Council Meeting – Proposal to start Integrated M.Phil.-Ph.D. Programmes in Environmental Sciences

This is with reference to your office letter No.: CUJ/Regr/2014/82, dated: Nil and the meeting held by honourable Vice-Chancellor on 12-12-2014. The Department intends to start Integrated M.Phil.-Ph.D. Programme from the Academic Session 2015-16.

You are requested to seek the approval of the competent authority to start these courses so that further necessary action in this regard may be taken.

HoD 15.12.14
(Deptt. of Environmental Sciences)

No:- CUJ/TAB/EVS/168
Dt:- 15/12/14

Dean 15.12.14
(School of Life Sciences)

Registrar, CUJ

Annexure - 18

Central University of Jammu
Department of Computer Science & I.T

The Department of Computer Science and Information Technology wants to start Integrated M.Phil-Ph.D and part-time Ph.D programmes from the Session 2015-16. It is requested that necessary permission may kindly be granted.

Head
Department of Computer Science
Central University of Jammu
Jammu

Dean
(School of Basic & Applied Sciences)

Registrar