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NORTH-EASTERN HILL UNIVERSITY  
SHILLONG - 7930 01

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No.AC:29-3/CONF/87-1111

Dated the 14th October, 1987.

To

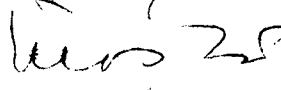
The Members of the  
Academic Council  
North-Eastern Hill University.

Subject : Minutes of the 29th meeting of the Academic  
Council.

Sir/Madam,

I am forwarding herewith the Minutes of the  
29th meeting of the Academic Council held on 1st July,  
1987 and 26th August, 1987 for favour of your information  
and comments, if any. This supersedes the minutes sent  
earlier vide letter No.AC:29-3/Conf/87-1042 dated the  
11th August, 1987.

Yours faithfully,



( D.C. Pant )  
Registrar  
N.E.H.U., Shillong.

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NORTH-EASTERN HILL UNIVERSITY  
SHILLONG - 7930 01

M I N U T E S

TWENTYNINTH MEETING  
of the  
ACADEMIC COUNCIL

Wednesday, the 1st July, 1987  
Shillong

Wednesday, the 26th August, 1987  
Shillong.

NORTH-EASTERN HILL UNIVERSITY  
Shillong - 793 001

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MINUTES OF THE TWENTYNINTH MEETING OF THE ACADEMIC COUNCIL

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AC:29:87:01(e): The comments received from Shri J. Bhagawati were considered by the Council and it felt that the change in the decision was not called for. The Council RESOLVED that its earlier resolution No.AC:28:87:05:8(v) in respect of Shri. M.L.Purkayastha should stand.

Item No.3            RATIFICATION OF ACTION TAKEN BY THE  
VICE-CHANCELLOR :

(i)                    Nomination of NEHU Representatives in  
the Governing Body of Serchip College -

AC:29:87:03:(i): The Council RESOLVED to approve the action taken by the Vice-Chancellor in nominating Dr. L.N. Singh, Reader in Psychology and Mrs. Rami Relte, Lecturer in English as NEHU representatives in the Governing Body of Serchip College for a period of two years and to recommend to the Executive Council.

(ii)                   Ph.D. Results -

AC:29:87:03:(ii): While considering the Ph.D. Results as approved by the Vice-Chancellor, the Council was informed that some names of candidates from some of the Departments whose results have already been announced have not been included in the list. The Council, therefore, RESOLVED that all the names of candidates whose results have been declared between 14th January, 1984 and 23rd June, 1987, may be incorporated in the list and it RESOLVED to approve the action taken by the Vice-Chancellor in declaring the Ph.D. results and to recommend to the Executive Council for favour of approval. The Ph.D. results as approved by the Council is at Appendix -II.

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## (iii) M.Phil Results -

AC:29:87:03(iii): The Council RESOLVED to approve the action taken by the Vice-Chancellor in declaring the M.Phil Results of the candidates who have qualified during the period from 14th January, 1984 to 3rd June, 1987. The M.Phil Results as approved by the Council is at Appendix - III.

## Item No. 5 ACADEMIC MATTERS :

## 5:1 - Statutes, Ordinances, Regulations &amp; Rules -

## (i) Assent of the Visitor to Ordinance OA-4 and Clause 17.1 of Ordinance OB-6 -

AC:29:87:05:1(i): The Council noted the assent of the Visitor to the amendment of Ordinance OA-4 on 'Assignment of Departments of the School of Studies' and also to the amendment of Clause 17.1 of Ordinance OB-6 on 'Affiliation of Colleges'.

## (ii) Nomenclature of the Centre for School Science and Mathematics -

AC:29:87:05:1(ii): The Council considered the recommendations of the Advisory Committee of the Centre for School Science and Mathematics made by the Committee in its meeting held on the 13th and 14th April, 1987 and RESOLVED that the Centre for School Science and Mathematics may be redesignated as the "Centre for Science Education". It further observed that the Centre, which has to generate interactions at all levels as well as to popularise Science and Mathematics among all, special attention may be paid to Science and Mathematics Education at the School level.

It further RESOLVED to recommend the change of nomenclature to the Executive Council for favour of approval.

Cont d/....

## 5:2- Syllabus -

- (i) Revised syllabi for B.Sc. (Pass & Honours) Course in Botany -

AC:29:87:05:2(i): The Council RESOLVED to approve the syllabi for B.Sc. (Pass & Honours) courses in Botany as revised by the Board of Under-Graduate Studies in Botany in its meeting held on the 26th June, 1987. The syllabi as approved by the Council are at Appendices - IV & V.

## 5:5- Examination Matters -

- (i) Provision for Supplementary Examination for M.Phil -

AC:29:87:05:5(i): The Council observed that there was no provision for Supplementary Examinations in the case of Post-Graduate Examinations and as such there could be no Supplementary Examinations for M.Phil. The Council, however, agreed that facilities may be provided so that repeaters may complete the course as early as possible.

- (ii) Admission to Third Year Honours Course of students coming from other Universities on completion of Two Years Pass Course -

AC:29:87:05:5(ii): The Council RESOLVED to authorise the Vice-Chancellor to constitute a Committee to examine the matter in all its aspects and to submit its report in the next meeting of the Council.

Contd/...

## (iii) Panels of Examiners -

AC:29:87:05:5(iii): The Council considered the panels of examiners for examining the M.Phil/Ph.D. theses of the following candidates and RESOLVED to approve the panels and to recommend to the Executive Council for consideration :-

<u>Name of the candidate</u>	<u>Department</u>
1. Ms. Didcy Laloo (Ph.D)	Chemistry
2. Mr. Manash Das Gupta (Ph.D)	Chemistry
3. Ms. Jaya Choudhury (M.Phil)	History
4. Mr. Apurba Kr. Medhi (M.Phil)	Economics
5. Mr. Mrinal Kanti Mitra (M.Phil)	Economics
6. Mr. P.K.Panigrahi (M.Phil)	Political Science
7. Smt. Shibani Biswas (M.Phil)	Anthropology
8. Ms. Lucy Thomas (M.Phil)	Anthropology
9. Ms. Miriam Suching (M.Phil)	Anthropology
10. Shri P.K.Borah (M.Phil)	Zoology
11. Ms. Tirzah Kengoo (M.Phil)	English

## (iv) Certificate fees for Diploma and Certificate Courses -

AC:29:87:05:5(iv): The Council RESOLVED that a fee of Rs 25/- per candidate may be charged as Certificate fees for the Diploma and Certificate Courses, as prescribed for the Post-Graduate and Under-Graduate candidates. It also RESOLVED to recommend to the Executive Council for approval. The tuition fee will be the same as for P.G. courses but no fee will be charged from students for whom the course is a part of research work.

While considering the issue, it was brought to the notice of the Council that the School of Languages have been conducting courses in French, German and Russian Languages. But the courses have not yet been formally approved by the Council. The Council, therefore, RESOLVED to give its approval to the above mentioned courses being conducted by the School of Languages.

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(v) Marking scheme of the M.Sc. Geology  
Practical and Field Work -

AC:29:87:05:5(v): The Council observed that the matter should first be considered and approved by the Board of Post-Graduate Studies and the School Board and then placed before the Academic Council.

(vi) Scheduling of Examinations -

AC:29:87:05:5(vi): The Council noted that the General Elections to the Legislative Assembly of the State of Nagaland will be held in November, 1987 and to the State of Meghalaya in February, 1988. Since the examinations of the University are scheduled to be held in the month of November, 1987, the Council RESOLVED that the theory and other examinations may be held commencing from 2nd December, 1987. The practical examinations should, however, be conducted and completed in the month of October, 1987. The Post-Graduate examinations may, however, be held as per the University Calendar.

(vii) Permission to employees of the  
University to appear in examinations as private candidates -

AC:29:87:05:5(vii): The Council noted that female candidates, teacher candidates and those who are serving in NEHU Library, Government Libraries, Libraries of Colleges affiliated to NEHU, Library Associations or Institutions duly approved by the Executive Council, Inspecting Officers of the constituent units of NEHU and the defence personnel stationed within the territorial jurisdiction of NEHU are allowed to appear in Under-Graduate examinations as private candidates as per the provisions of the Regulations of the University. After careful consideration, the Council RESOLVED that this facility may be extended to the regular employees of the University, constituent colleges and colleges which are affiliated to the University. It further RESOLVED that the fact that a candidate appeared in the Under-Graduate examination private may be reflected in the Mark Sheet and not in the Certificate that may be issued by the University.

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## 5:6 - Establishment of new Departments/Centres/Courses -

- (i) Correspondence Course for farmers under the Centre for Rural Development and Planning, Department of Geography -

AC:29:87:05:6(i): The Council was apprised that the Correspondence Course will be restricted to the farmers of the North-Eastern Region and those who have working knowledge, that is, those who have studied upto Class VIII will be allowed to join the Course. Subsequently, the course will be conducted in local languages. The Course will be a non-qualifying course and no Certificate, etc., will be issued.

The Council considered the proposal and RESOLVED that the Correspondence Course should be started at Medziphema, which is the Headquarters of the Centre for Rural Development and Planning and not in the Department of Geography, NEHU, Shillong. The Council also observed that there should be no duplication in conducting the various courses, since the University has also the Centre for Distance Education, which deals with Correspondence Course.

- (ii) Establishment of the Academic Staff College -

AC:29:87:05:6(ii): The Council welcomed the proposal for establishment of the Academic Staff College in the University for imparting orientation courses to newly appointed College and University Lecturers, as approved by the University Grants Commission and further RESOLVED to recommend to the Executive Council.

- (iii) Introduction of +2 stage in six education institutions in Mizoram -

AC:29:87:05:6(iii): The Council considered the proposal of the Government of Mizoram for introduction of +2 stage in six education institutions, namely, (1) Kaichhunga College, Mamit; (2) P.E.Thanzela College, Darlawn; (3) Kawnpui College, Kanwpui; (4) Saitual College, Saitual; (5) North Eastern Khawdungsei College, Khawdungsei; (6) North Vanlaiphai College, North Vanlaiphai,

Contd/....

which are to be designated as Higher Secondary Schools. The Council RESOLVED to approve the proposal for conducting P.U. course of study in these Higher Secondary Schools if the Inspection Report as per the usual procedure is favourable and that the examinations will be conducted by the Pre-University Board of the University until the State of Mizoram has its own Board of Higher Secondary School Education. It further RESOLVED to recommend to the Executive Council for consideration.

(iv) Introduction of Urdu and Manipuri at the Degree level -

AC:29:87:05: (iv): The Council RESOLVED to approve, in principle, introduction of Urdu and Manipuri in the University at the Degree level as MIL provided the conditions laid down and the procedure prescribed for such cases are fulfilled. It also RESOLVED to recommend to the Executive Council.

(v) Introduction of Tenyidie (Angami Language) as a subject in the P.U. Course ...

AC:29:87:05:6(v): The Council RESOLVED to approve in principle introduction of Tenyidie (Angami Language) in the University as one of the MIL subjects at the P.U. level subject to fulfilment of usual conditions and procedure prescribed for the purpose.

5:7 - Affiliation, etc. -

(i) Introduction of Sociology in B.A. (Honours) at St. Edmund's College, Shillong -

AC:29:87:05:7(i): The Council considered the recommendation of the Inspection Committee and RESOLVED to approve introduction of Sociology in B.A. (Honours) at St. Edmund's College, Shillong.

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## 5:8 - Others -

- (i) Long Term Plan perspective of the  
Centre for School Science and  
Mathematics -

AC:29:87:05:8(i): The Council considered the Long Term Plan perspective consisting of four main streams of activities, namely, (1) Popularisation of Science and Mathematics, (2) Enrichment and Improvement Programmes, (3) Research and Development Programmes and (4) Awareness Programmes drawn up by the Centre for School Science and Mathematics in its meeting held on the 13th and 14th April, 1987 and RESOLVED to approve in principle. The details and modalities for implementation may, however, be worked out by various Committees that may be constituted by the Vice-Chancellor.

Item No. 6 ADMINISTRATIVE MATTERS :

## 6:1 - Selection Committee -

- (i) Constitution of Selection Committee  
for Constituent Colleges -

AC:29:87:06:1(i): The Council RESOLVED that sub-clauses (i) and (ii) of Statute 20(2) provided for constitution of Selection Committees in respect of Lecturers of Colleges of Institutions maintained by the University may also apply in the case of recruitment of Lecturers to the Constituent Colleges of the University. It further observed that the Council may recommend to the Executive Council for its nomination out of panel of names drawn from Professors and Readers of the respective Post-Graduate Departments.

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6:6 - Service Condition/Financial & Other  
Benefits -

- (i) Revision of scales of teachers in Universities and colleges and other measures for maintenance of standards in Higher Education -

AC:29:87:06:6(i): The Council considered the contents of the letter No.F.1-21/87-U.I, dated the 17th June, 1987, conveying the decision of the Government of India on the recommendation of the Fourth Pay Commission and taking into account the recommendations of the University Grants Commission on the matter. It noted the various scales of pay prescribed for the teachers in the Universities and Colleges and other measures for maintenance of standards in Higher Education. The Council felt that the details in respect of revised scales of pay may be circulated for information of the teachers to enable them to exercise their option. For a final decision on the matter the Academic Council may meet again, shortly.

On conclusion of consideration of various Items on the Agenda, the members brought to the notice of the Council several discrepancies and anomalies in the advertisement of faculty positions released by the University, particularly with regard to specialisations. The Council after hearing the members representing the Departments, RESOLVED that a Committee consisting of the two Pro Vice-Chancellors, Registrar and the Deans of Schools may review and examine the anomalies in the specialisations appearing in the advertisement and that a corrigendum to advertisement may be issued by the University.

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In future the Departments concerned may be consulted before releasing the advertisements so that there may be no anomalies in the advertisements.

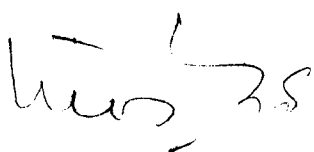
The meeting was adjourned at 3:00 p.m., with a Vote of Thanks from the Chair.

The adjourned meeting (29th) of the Academic Council was resumed on the 26th August, 1987 at 11:00 a.m. in the Mayurbhanj Seminar Hall.

The pending matter with regard to revision of pay scales was taken up and discussed at length. Considering all the pros and cons and the fact that since a majority of members of the faculty could not give sufficient thought to the issue for arriving at a decision, the Council RESOLVED to defer the decision on the matter for the next meeting.

The meeting ended with a Vote of Thanks from the Chair.

Sd/- R.K. Mishra  
Chairman  
Academic Council  
N.E.H.U.

  
( D.C. Pant )  
Secretary  
Academic Council  
N.E.H.U.

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NORTH-EASTERN HILL UNIVERSITY  
SHILLONG - 793 001

LIST OF MEMBERS ATTENDING THE TWENTY-NINTH MEETING OF THE  
ACADEMIC COUNCIL HELD ON 1ST JULY, 1987.

1. Prof. A.K.Mishra,  
Vice-Chancellor,  
NEHU, Shillong.
2. Prof. Kiremwati. Ao,  
Pro-Vice-Chancellor,  
Nagaland Campus, Kohima.
3. Prof. R.R.Mehrotra,  
Pro-Vice-Chancellor,  
Mizoram Campus, Aizawl.
4. Shri. A.Patton,  
Controller of Examination,  
NEHU, Shillong.
5. Prof. A.k.Sharma,  
Department of Public Administration.
6. Dr. T.Mathew,  
Department of Economics,  
NEHU, Shillong.
7. Prof. H.Junjappa,  
Department of Chemistry,  
NEHU, Shillong.
8. Prof. K.S.Lyngdoh,  
Dean, School of Languages,  
NEHU, Shillong.
9. Prof. C.S.Shastry,  
Department of Chemistry,  
NEHU, Shillong.
10. Prof. S.Homchoudhury,  
Department of English,  
NEHU, Shillong.
11. Rev.Bro.H.G.Shannon,  
St.Edmund's College,  
Shillong.
12. Shri R.Kharpor,  
Kiang Nongbah Government  
College, Jowai.
13. Dr. Soumen Sen,  
NEHU, Shillong.
14. Dr. A.P.Sinha,  
Department of Anthropology,  
NEHU, Shillong.
15. Shri Ali Ahmed,  
Department of Geography,  
NEHU, Shillong.

Contd/...

16. Dr. R.Gopalakrishnan,  
Department of Geography,  
NEHU, Shillong.
17. Dr. M.A.Sudhir,  
Department of Education,  
Mizoram Campus, Aizawl.
18. Shri J.C.Binwal,  
Librarian, NEHU, Shillong.
19. Prof. B.N.Saraswati,  
Visiting Professor,  
School of Social Sciences,  
NEHU, Shillong .
20. Prof. P.Shukla,  
Institute of Self Organising Systems  
and Bio-Physics, NEHU, Shillong.
21. Prof. M.N.Karna,  
Department of Sociology,  
NEHU, Shillong.
22. Sri. A.B.Dutta,  
St. Anthony's College,  
Shillong.
23. Shri. H.D.kosanga,  
Principal, Serchip College,  
Serchip.
24. Shri. Imsen Ao,  
Principal, Dimapur College,  
Dimapur.
25. Shri K.Kikon,  
Dimapur College,  
Dimapur.
26. Shri Lalbiakthanga,  
Kolasib College,  
Kolasib.
27. Prof. K.Chatterjee,  
Department of Zoology,  
NEHU, Shillong.
28. Prof. A.N.Kai,  
Department of Bio-Chemistry.  
NEHU, Shillong.
29. Prof. R.R.Mishra,  
Department of Botany,  
NEHU, Shillong.
30. Prof. M.K.Khare,  
Dean, School of Life Sciences,  
NEHU, Shillong.

31. Prof. h.P. Bajpai,  
Institute of Self Organising  
Systems and Bio-Physics,
32. Prof. Saingenga,  
Principal, Pachhunga University College,  
Aizawl.
33. Prof. J.B. Bhattacharjee,  
Department of History,  
NEHU, Shillong.
34. Prof. K.K. Sharma,  
Nagaland Campus, Kohima.
36. Prof. R.P. Kachhara,
37. Prof. P.K. Mishra,  
Department of Anthropology,  
NEHU, Shillong.
38. Prof. A.C. Sinha,  
Department of Sociology,  
NEHU, Shillong.
39. Prof. P.L. Kar,  
School of Agricultural Sciences and  
Rural Development.
40. Prof. R.L. Walli,  
Department of Political Science.  
NEHU, Shillong.
41. Prof. J.P. Singh,  
Department of History,  
NEHU, Shillong.
42. Prof. B. Pakem,  
Department of Political Science,  
NEHU, Shillong.
43. Prof. Haridwar kai,  
Department of Political Science,  
NEHU, Shillong.
44. Shri Jaytish Bhagabati,  
St. Edmund's College,  
Shillong.
45. Shri I.M. Simon.

46. Mrs K.S.Lyngdoh,  
Department of Education,  
NEHU, Shillong.
47. Prof. P.P.Gokulanathan,  
Dean, School of Educational  
Research and Studies.
48. Prof. M.C.Pandey,  
Centre for Adult and Continuing  
Education.
49. Prof. Man.M.Singh,  
Centre for School of Sciences  
and Mathematics, NEHU, Shillong.
50. Shri Min F.Whiso,  
Kohima Science College,  
Kohima.
51. Dr. R.V.Vyas,  
Department of Philosophy,  
NEHU, Shillong.
52. Prof. C.N.Bhalerao,  
School of Social Sciences,  
NEHU, Shillong.
53. Prof. T.S.B.Narasaraju,  
Dean, School of Physical Sciences,  
NEHU, Shillong.
54. Dr. K.K.Upadhyaya,  
Department of Economics,  
Mizoram Campus, Aizawl.
55. Prof. H.Bareh,  
Centre for Creative Arts,  
NEHU, Shillong.
56. Prof. A.G.George,  
Department of English,  
Kohima Campus, Kohima.

## SYLLABUS IN BOTANY FOR THE THREE YEAR B.Sc. DEGREE COURSE

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For the first two years of B.Sc. - PassCourse :

## Theory :

- Paper - I - Cryptogams and Phanerogams.
- Paper - II - Anatomy, Embryology, Cytogenetics and Evolution, Plant Physiology, Ecology and Phytogeography.

## Practical :

- Paper - III - Based on the course content of the Theory Papers I & II.

For the third year B.Sc. Honours Course -

- Paper - IV - Plant Diversity.
- Paper - V - Microbiology, Plant Pathology, Cell Biology and Cytogenetics.
- Paper - VI - Ecology, Environment, Plant Structure and function.

## Practical :

- Paper - VII - Plant Diversity, Angiosperm Taxonomy, Cell Biology and Cytogenetics.
- Paper - VIII - Microbiology, Plant Pathology, Morphology, Plant Physiology and Ecology.

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B.Sc. (Pass Course)

PAPER I : CRYPTOGAMS AND PHANEROGAMS

Maximum Marks : 100

Time : 3 hours

PART I - CRYPTOGAMS

I.1. ALGAE : General account , classification, reproduction, lifecycle, pigments.

- (a) Myxophyceae (Cyanophyceae): General account of distribution cell structure, organization and range of structure, reproduction, role of Blue green algae in Nitrogen fixation and type study of Scytonema.
- (b)
- (b) Chlorophyceae: A general account of distribution, cell structure, organization and range of structure, reproduction and type studies of Chlamydomonas, Volvox, Ulothrix, Cladophora, Pedogonium, Vaucheria and Chera.
- (c) Bacillariophyceae : A general account of distribution, cell structure, reproduction and economic importance of Diatoms and Desmids.
- (d) Phaeophyceae : A general account of distribution, structure of plant body, reproduction and type studies of Ectocarpus, Fucus,
- (d) Phodophyceae : A general account of distribution, structure of plant body, reproduction and type studies of Batrapus, permum, Polysiphonia.

I.2. FUNGII : General, account classification, reproduction, lifecycle, nutrition of fungi and economic importance.

- (a) Phycomycetes : A general account of distribution, structure, reproduction and type studies of Saprolegnia, Phytophthora, Cystopus.
- (b) Ascomycetes : A general account of distribution, structure, reproduction and economic importance and type study of Eysiphe
- (c) Basidiomycetes : A general account of distribution, structure, reproduction and economic importance and type studies of Ustilago, Puccinia, Agaricus.
- (d) Deuteromycetes : Type studies of Alternaria, Fusarium, and Their economic importance.

Contd/.....

I. 3. LICHENS, BACTERIA AND VIRUSES : General account of structure , reproduction and their economic importance, mode of transmission, nature and symptoms of bacterial and viral diseases.

I. 4. BRYOPHYTES : General account of origin, classification, reproduction, alternation of generation and type studies of the following :-

Marchantiales : Riccia Marchantia

Anthocerotales: Anthoceros

Musci: Sphangum

I.5 PERIDOPHYTES : A general account of origin, classification range of structure and evolution of stele, reproduction, origin and significance of heterospory and seed habit, alternation of generation, inter-relationship of various groups, Type studies of the following :-

Psilophytins : Thynia

Lycopodinae : Lycopodium, Selaginella

Equisetinae : Equisetum

Filicinae : Adiantum, Marsilea

PART II - PHANEROGAMS

II. 1. GYMNOSPERMS : General characters, classification, general account of Cycadofilicales and a detailed study of structure, reproduction and economic importance of the following .

Cycadales - Cycas, Coniferales - Pinus,

Gnetales - Gnetum

II. 2. ANGIOSPERMS : Principles of classification, outlines of Benthom and Hooker's, Engler and Prantle's classification of angiosperm. A detailed knowledge of the following families and their economic importance.

- (a) Dicotyledons : Ranunculaceae, Magnoliaceae, Nymphaeaceae, Cruciferae, Malvaceae, Leguminosae, Cucurbitaceae, Compositae, Convolvulaceae, Acanthaceae, Labiaceae,
- (b) Monocotyledons; Orchidaceae, Liliaceae, Gramineae.
- (c) Economics Botany : Economics importance and cultivation of rice, tea and jute, a general account of fibre plants (cotton, coconut), oil yielding plants (mustard and Sesamum) medicinal and aromatic plants (Rauwolfia, Cinchona, Citronella, Mentha) spices and condiments (Cinnamomu, Piper, Cardamum) and timber trees (teak, seah pine).

SUGGESTED READING :

- Gupta, R.K. 1972. Text Book of Systematic Botany, Atma Ram. New Delhi.
- Smith, G.M. 1971. Cryptogamic Botany Vol.I & II, Tata McGraw Hill, New Delhi.
- Mitra, J.N. 1977. Elements of Systematic Botany of Angiosperma and Plant Ecology, World Press, Calcutta.
- Bessy E.A. 1950. Morphology and Taxonomy of fungi, Hafner Press, New York.
- Chamberlain, C.S. 1966. Gymnosperms : Structure and Evolution. Dover Publications, New York.
- Emes, A.J. 1961. Morphology of the Angiosperma, Tata McGraw Hill, Bombay.
- Mehrotra, R.S. 1980. Plant Pathology, Tata McGraw Hill Publishing Co., New Delhi.
- Singh, R.S. 1973. Plant Diseases, Oxford and IBH, New Delhi.
- Mundkar, B.B. 1967. Fungi and Plant Diseases, MacMillan, Calcutta.
- Rangaswami, G. 1972. Diseases of Crop Plants in India, Prentice Hall, New Delhi.

Alwopoules, C.J. 1973. Introductory Mycology, Wiley Eastern, New Delhi.

Gwynvayghan, H.C.I. & Barnes, B. 1937. The structure and the Development of Fungi. Cambridge University Press .

Mukharji .K.G. 1962 - 1972. Fungi of India, Emkay Publications, New Delhi.

Mahanta, K.C. 1969. Fundamental of Agriculture Microbiology, Oxford & IBH , Calcutta.

Alexander, M. 1978. Introduction to Soil Microbiology, Wiley Eastern, New Delhi.

Biswas, S.B. and Biswas, A. 1976. Introduction to Viruses, Vikas, New Delhi.

Pant, D.D. 1973. Cycas and the Cycadales, Central Book Depot, Allahabad.

Parihar, N.S. 1972. An introduction to Embryophyta Vol. I. Bryophyta, central Book Depot. Allahabad.

Chopra, G.L. & Yadav, D.I. 1980. A text Book of Bryophyta, Vishal Publications.

Contd/-.....

B.Sc. (Pass Course)

## PAPER II (THEORY):

ANATOMY, EMBRYOLOGY, CYTOGENETICS AND EVOLUTION, PLANT PHYSIOLOGY,  
ECOLOGY AND PHYTOGEOGRAPHY.

Maximum Marks: 100

Time 3 hours

PART - I

1. ANATOMY AND EMBRYOLOGY : Tissues and tissue systems; Meristems - Different types (apical, intercalary and lateral); root stem transition root anatomy; leaf anatomy, Secondary and anomalous secondary growth cambium in normal position with abnormal activity and cambium in abnormal position with normal activity eg., Nyctanthus, Mirabilis, Cucurbita, Achyranthus, Bougainvillea, Amaranthus, Bigonia, Passiflora, Piper and Draceana.

Microsporogenesis and megasporogenesis, development of male and female gametophytes (monosporic, bisporic and tetrasporic - various types), a general account of fertilization, embryo development, endosperms, apomixis and polyembryony.

2. CYTOGENETICS AND EVOLUTION : Ultra structure of cell and its major components, cell divisional mitosis and meiosis preliminary account of nucleic acid structure of chromosome, Mendel's laws of inheritance linkage; crossing, chromosome theory of heredity, mutation; Darwin's theory of evolution; Principles of speciation.

PART - II

1. PLANT PHYSIOLOGY : Physical and chemical properties of cytoplasm; Colloids and solutions osmosis, inhibition, diffusion, D.P.D. and plasmolysis; mineral nutrition, absorption of water and nutrients; transpiration; photosynthesis and respiration; basic mechanisms and factors affecting above processes; seed germination, seed dormancy and viability; growth and development; vernalization and photoperiodism; tropic movement senescence.

Contd/.....

2. ECOLOGY and PHYTOGEOGRAPHY : Basic concepts of Ecology; (Habitat, Population, community, ecosystem and Biosphere); a general account of ecological factors (climatic, edaphic and biotic); plant succession (hydrosere and Xerosere); community structure, adaptational features of plant species in relation to xeric and hydric conditions; a preliminary account of structure and function of forest and lake ecosystem, a general account of environmental pollution, Principles of conservation, botanical regions of India, vegetational types of N.E. India.

SUGGESTED READING :

- Esau, K. 1960. Anatomy of seed Plants, Wiley Eastern, New Delhi.
- Esau, K. 1965. Plant Anatomy, Wiley Eastern, New Delhi.
- Moody, P.A. 1970. Introduction to Evolution, Kalyani Publication, Ludhiana.
- Bidwell, R.G.S. 1974. Plant Physiology, MacMillan, New York,
- Devlin, R.M. 1974. Plant Physiology, Affiliated East west, New Delhi.
- Hess, D. 1975. Plant Physiology - Molecular, Biochemical and Physiological Fundamental of Metabelism and Development, Springer-Verleg. Berlin.
- Wilson, B. and Morrison. J.H. 1966. Cytology, Affiliated East West Press, New Delhi.
- Bhojvani, S.S. & Bhatnagar, S.P. 1975. Embryology of Angiosperms, Vikas Publications, New Delhi.
- Maheshwari, P. 1971. An introduction to the E, bryology of Angies perms, Tata McGraw Hill, New Delhi.
- Pandey, B.P. 1979. Plant Anatomy, S. Chand & Co., New Delhi,
- Ambasht, R.S. 1974. A Text Book of Plant Ecology, Students Friends Varanasi.
- Kormondy, E.J. 1978. Concepts of Ecology, Prentice Hall of India, New Delhi.

- Kumar, H.D. 1977. Modern Concepts of Ecology, Vikas, New Delhi.
- Odum, E.P. 1971. Fundamental of Ecology, W.B. Saunders, Philadelphia
- Mitra, J.N. 1967. Elements of Systematic Botany of Angiosperms and plant Ecology, World Press, Calcutta.
- Weaver, J.E. and Clements, C.E. 1966. Plant Ecology, Tata McGraw Hill, Bombay.
- Chandrasekharan, S.N. and Parthasarathy, S.V. 1965. Cytogenetics and Plant Breeding. P. Varadachary & Co., Madras.
- Swamy, D.G.L., and Kirshnamurthy, K.V. 1980. From flower to fruit, Tata McGraw Hill Publication Co. New Delhi.
- Persiaswamy, K. and Verma, V. 1972. An introduction to Cytology. Genetics and Evolution, Enkay Publication, New Delhi.

PAPER III ( PRACTICAL ) :

CRYPTOGAMS, PHANEROGAMS, ANATOMY, EMBRYOLOGY, CYTOLOGY, GENETICS, PHYSIOLOGY, ECOLOGY, AND PHYTOGEOGRAPHY.

Maximum Marks : 100

Time 3 hours

1. CRYPTOGAMS :

Bisection, drawing, description and identification of prescribed specimens or microscopic preparation of the same and collection of materials from field study.

Algae - 8      Fungi - 8

Bryophytes - 5      Pteridophytes - 5

2. PHANEROGAMS :

Dissection, preparation of suitable slides, drawing and describing the plant or plant parts in technical terms; assigning plants to their respective families and general knowledge on the preparation of Herbarium specimens.

Gymnosperm - 5      Angiosperm - 8

3. ANATOMY :

Maceration of tissues and identification of tissue elements primary and secondary structures of monocot and dicot roots and stems, vascular bundles, anomalous secondary growth in stem with reference with reference to general prescribed in theory syllabus; structure of various types of leaves.

Contd/.....

## 4. CYTOLOGY :

Temporary acetocarmine and orcein Smear preparation of flower buds and root tips. Description and identification of preparation showing mitotic and meiotic stages.

.....5

## 5. PHYSIOLOGY:

Demonstration of the following; Effect of temperature on inhibition, Determination of osmotic pressure by plasmolytic method Plasmolysis and Plasmolysis, Demonstration of tropic movements with reference to light and gravity Stomatial mechanism.

.....8

## 6. ECOLOGY &amp; PHYTOGEOGRAPHY :

Determination of requisite size quadrat; Estimation of frequency and density; Adaptational features of xerophytes, halophytes and epiphytes (e.g. Cactus, waterlily, orchids, halophytes slides).

.....10

## 7. Spots (5 of which atleast two from E, bryology - and one from Genetics)

.....10

## 8. Viva - Voce

.....10

## 9. Practical record and field note book.....6

## 10. Material collection

.....6.

Contd/.....

B.Sc. (Honours)

PAPER IV (THEORY) : PLANT DIVERSITY

Maximum Marks : 100

Time : 3 hours.

Range of structure and reproduction in algae; fungi, bryophytes, pteridophytes, gymnosperms and angiosperms with reference to the types/families studied during first two years of B.Sc. and the following additional types/families:

## 1. Algae :

Anabaena, Rivularia, Hydrodictyon, Coleochaete, Nitella,  
Laminaria, Dictyota.

## 2. Fungi :

Synchytrium, Peronospora, Claviceps, Peziza, Melanospora  
Plurotus, Heminthosporium.

## 3. Bryophytes :

Evolution of Thallus & Sporophyte, Targionia, Pellia  
Notothylas.

## 4. Pteridophytes :

Psilotum, Sigillaria, Ophioglossum, Salvinia, Azolla;  
Evolution of sori and sorus structure; telome theory,  
Interrelationships of various groups of Pteridophytes.

## 5. Gymnosperms:

Geographical distribution and evolutionary trends;  
Ginkgo, Taxus, Thuja, Cordaitales, Bennethitales.

## 6. Angiosperms:

International code of Botanical nomenclature; Acomparative study of the systems of classification: Bentham & Hooker, Englea & Prantle, Hutchinson & Takhtajan.

Angiosperms Families: Solanaceae, Cyperaceae,  
Cannaceae, Zingiberaceae, Palmae Araceae.

Origin and Morphology of flower with special reference to  
stament & Carpel, Phylode theory.

\* Life History details of the types are not required.

## 7. Pollen Morphology.

## SUGGESTED READING :

- Gupta, R.K. 1972. Text Book of Systematic Botany. Atma Ram, New Delhi.  
Smith, G.M. 1971. Cryptogamic Botany, Vol. I&II. Tata McGraw Hill,  
New Delhi.  
Mitra, J.N. 1967. Elements of Systematic Botany of Angiosperms and  
Plant Ecology, World Press, Calcutta.  
Bessey, E.A. 1950. Morphology and Taxonomy of Fungi, Hafner Press,  
New York.

- Chamberlain, C.S. 1966. Gymnosperms; Structure and Evolution, Dover Publications, New York.
- Eames, A.J. 1961. Morphology of the Angiosperms, Tata McGraw Hill, Bombay.
- Mehrotra, R.S. 1980. Plant Pathology, Tata McGraw Hills Publication Co., New Delhi.
- Singh, R.S. 1973. Plant ~~Pathology~~ Diseases, Oxford and IBH, New Delhi.
- Mundkar, B.C. 1967. Fungi and Plant Diseases, Mc Millan, Calcutta.
- Rangaswami, G. 1972. Diseases of Crop Plants in India, Prentice Hall, New Delhi.
- Alexopoulos, C.J. 1973. Introductory Mycology, Wiley Eastern, New Delhi.
- Gwynerevaughan, H.C.I. & Barnes, B. 1937. The structure and the Development of Fungi Cambridge University Press.
- Mukherji, K.G. 1962- 1972. Fungi of India, Emkay Publication, New Delhi.
- Mahanta, K.C. 1969. Fundamentals of Agricultural Microbiology Oxford & IBH, Calcutta.
- Alexander, M. 1978. Introduction to Soil Microbiology, Wiley Eastern, New Delhi.
- Biswas, S.B. and Biswas, A. 1976. Introduction to Viruses, Vikas New Delhi.
- Plant, D.D. 1973, Cycas and the Cycadales, Central Book Depot., Allahabad.
- Parihar N.S. 1972. Introduction to Embryophyta, Vol. I, Bryophyta, Central Book Depot, Allahabad.
- Parihar. N.S. 1973. Introduction to Embryophytam Vol. II Pteridophyta, Central Book Depot., Allahabad.
- Chopra, G.L. & Yadav, D.I. 1980. A text Book of Bryophyta, Vishal Publications Jullundar.

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#### PAPER V (THEORY)

#### MICROBIOLOGY, PLANT PATHOLOGY, CELL BIOLOGY AND CYTOGENETICS

Ultrastructure of Prokaryotic (Bacteria & Cyanobacteria) and eukaryotic (Fungi) Cells; Structure, chemical nature and economic importance of Viruses; Microbiology of food (dairy bakery beverages), food spoilage and preservation; soil microbiology with reference to biodegradation; nutrient transformation, factor affecting distribution of microorganism in soil; a general account of biological nitrogen fixation.

Principles of Plant Pathology; Classification of plant pathogens; parasitism, mode of infection and disease development, host parasite relationship; plant disease control—chemical and biological; General idea of common plant diseases of the region (late and early blight of potato, Blast of rice, Citrus Canker).

General account of functional aspects of ; plasma membrane, endoplasmic reticulum, Golgi Complex, mitochondria, plastids, ribosomes, lysosome, nuclear membrane, nucleolus and chromatin, gene ~~interaction~~ interaction, multiple alleles, extra-nuclear inheritance; gene concept and genetic code; sex chromosomes and sex determination; chromosomal aberrations; hybridisation and hybrid vigour.

SUGGESTED READING :

Smith, G.M. 1971, G.M. 1971, Cryptogamic Botany Vol.I, Tata Mc Graw Hill, New Delhi.

Bessey, E.A. 1950. Morphology and Taxonomy of Fungi, Hafner Press, New Delhi -

Mehrotra, R.S. 1980. Plant Pathology. Tata McGraw Hill Publishing Co., New Delhi.

...

- Singh, R.S. 1973. Plant Diseases, Oxford and IBH, New Delhi.
- Munekar, B.B. 1967. Fungi and Plant diseases, Macmillan, Calcutta.
- Rangaswami, G. 1972. Diseases of crop plants in India, Prentice Hall, New Delhi.
- Alexopoulos, C.J. 1973. Introductory Mycology, Wiley Eastern, New Delhi.
- Mahanta, K.C. 1969. Fundamentals of agricultural microbiology, Oxford and IBH, Calcutta.
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- Chandrasekharan, S.N. and Parathasarathy, S.V. 1965. Cytogenetics and plant breeding, F. Varadachery & Co., Madras.
- Pariyawamy, K. and Varma, V. 1972. An Introduction to Cytology. Genetics and Evolution, Emkay Publications, New Delhi.
- Wilson, B. and Morrison, H.H. 1966. Cytology, Affiliated East West Press, New Delhi.

## B.Sc. (Honours)

## Paper VI (Theory)

Ecology, Environment, Plant Structure and Function.

Max. Marks - 100

Time - 3 hours.

Population and its attributes (Age structure, population growth, natality, mortality), population interactions, community development and organisation; structural and functional aspects of ecosystem (food chain, ecological pyramids, productivity, flow of energy, cycling of nutrients); environmental problems; pollution (water, air); environmental degradation with particular reference to the north-eastern region (deforestation, soil erosion shifting cultivation); conservation of natural resources (plant, soil, water).

Enzymes : Structure, classification, mechanism of action, chemistry of nitrogen metabolism, carbon assimilation and respiration, structure of photosynthetic pigments, mechanism of carbon assimilation, in  $C_3$ ,  $C_4$ , and CAM plants; growth: factors (environmental and nutritional) influencing growth, growth hormones (auxins, gibberellins, cytokinins) and their mode of action of action.

Meristem: Organisation and morphogenesis in shoot and root apical meristems; cambium and its derivatives, cambial activity and factors influencing it, wood formation (heart, sap and reaction woods) ; structure of : dermal, mechanical and conducting tissues; fertilisation in flowering plants; types of embryo and endosperm development; nutrition of embryo.

## SUGGESTED READINGS:

- Esau, K, 1960. Anatomy of seed plants, Wiley Eastern, New Delhi.  
 Esau, K. 1965. Plant anatomy, Wiley Eastern, New Delhi.  
 Bidwell, R.G.S. 1974. Plant Physiology, MacMillan, New York.  
 Devlin, R.M. 1974. Plant Physiology, Affiliated East West, New Delhi.  
 Hess, D. 1975. Plant Physiology - Molecular, Biochemical and Physiological fundamentals of metabolism and development, Springer-Verlag, Berlin.  
 Bhojwani, S.S. & Bhatnagar, S.F. 1975. Embryology of Angiosperm, Vikas Pub. New Delhi.

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- Maheshwari, P. 1971. An introduction to the embryology of angiosperms, Tata McGraw Hill, New Delhi.
- Ambasht, R.S. 1974. A text book of Plant Ecology, Students Friends, Varanasi.
- Kormondy, E.J. 1978. Concepts of Zoology, Prentice Hall of India, New Delhi.
- Kumar, B.P. 1977. Modern concepts of Zoology, Vikas, New Delhi.
- Odum, E.P. 1971. Fundamentals of Ecology, W.B. Saunders, Philadelphia.
- Weaver, J.E. & Clements, E.E. 1966. Plant Ecology, Tata McGraw Hill, Bombay.
- Swamy, B.G.L. and Krishnamurthy, K.B. 1980. From flower to Fruit. Tata McGraw Hill, Pub. Co., New Delhi.
- Fahh, A. 1974. Plant Anatomy, Pergamon Press, Oxford.
- Eames, A.J. and MacDancils, L.H. 1947. An introduction to plant anatomy, Tata McGraw Hill Book. Co., Bombay.

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Paper - VII (Practical)

PLANT DIVERSITY, ANGIOSPERM TAXONOMY, CELL BIOLOGY AND CYTOGENETICS.

Max. Marks - 100

Time - 6 hours.

I. Cryptogams : ..... 25

1. Preparing suitable microscopic slides of cryptogams prescribed in theory, by dissection, section cutting, mounting, spore, measurement, drawing, description and identification.
2. Collection of suitable specimens from excursion and submission of dry or bottle specimens at the time of examination.
3. Prepared microscopic slides to be submitted at the time of examination.
4. Practical records of class work and excursion report duly signed by the teacher should be submitted by the students for inspection.

II. Phanerogams : ..... 20

1. Students will be expected to dissect, draw and describe plant specimens of the prescribed families in simple technical language and identify at least two genera with the help of local flora.
2. Identification of families of common local plants at sight.

Contd/..

3. Collection and preparation of herbarium specimens; submission of herbarium sheets and other specimens representing different groups of plants.
4. Frequent local excursion to gain familiarity with the local flora and if possible, excursion to the various phytogeographical zones for a broader idea of Indian flora and submission of field report.

III. Cell Biology : ..... 10

1. Differential staining of DNA & RNA (Fuulgin, methyl green, pyronin, etc.).
2. Staining of nucleolus.
3. Study of lampbrush and polytene chromosomes.

IV. Genetics : ..... 10

1. Mendel's Laws - mono and dihybrid ratios.
2. Modification of dihybrid ratios.
3. Study of chromosomal aberrations from permanent slides.

III.

1. Viva-Voce ..... 10
2. Spots ( 5 Nos) ..... 10
3. Practical Record ..... 10
4. Herbarium sheets and specimens ..... 5

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Paper - VIII (Practical):

MICROBIOLOGY, PLANT PATHOLOGY, MORPHOLOGY PLANT PHYSIOLOGY & ECOLOGY.

Max. Marks - 100

Time - 6 hours.

I. Microbiology : ..... 15

1. Preparation of slides of microorganisms (i.e. blue-green algae, bacteria, fungi) as prescribed in theory; staining, mounting, spore measurement drawing and identification.
2. Prepared microscopic slides to be submitted at the time of examination.
3. Practical records of class work should be submitted at the time of examination.

II. Plant Pathology : ..... 15

1. Preparation of microscopic slides from diseased materials of pathogenic fungi as described in the theory, dissection, staining, mounting, spore measurement, drawing and identification.
2. Collection of specimens and submission at the time of examination.

Contd/...

3. Prepared microscopic slides to be submitted at the time of examination.
4. Practical record of class work and excursion report should be submitted at the time of the examination.

III. Morphology (Anatomy and Embryology) : ..... 15

Study of types of organisation in shoot and root apical meristems, cambium; study of cambium, xylem and phloem, various types of wood (heart, sap and reaction woods). Epidermal studies, Anatomy of  $C_3$  and  $C_4$  plants, study of microsporogenesis, megasporogenesis and development of dicot (crucifer) and monocot types of embryo with the help of permanent slides; Microtechnique. (Out of 15 marks Microtomy will be of 7 marks and section cutting etc., will be of 8 marks).

IV. Physiology: ..... 15

1. Measurement of the rate of transpiration using photometer.
2. Measurement of the rate of transpiration under different environmental conditions using photometer.
3. Comparison of rate of transpiration from the two surfaces of a leaf.
4. Relation between absorption and transpiration.
5. Effect of light and  $CO_2$  concentration on rate of photosynthesis using bubble count method.
6. Separation of plant pigments by paper chromatography.
7. Determination of R.Q. of different plant materials\* (carbohydrates, fats, and organic acids).

V. Ecology : ..... 15

1. Estimation of frequency of the plant species in the local vegetation; construction of frequency histogram and interpretation of data.
2. Estimation of density and abundance of the plant species in the local grassland and forest communities using quadrat method.