(~91) 98895 09751
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KRISHNA DEVI BALIKA DEGREE COLLEGE

LOHIAPURAM, AVAS VIKAS, FARRUKHABAD (U.P.) 209625

College Code: - FB50

Date:- 01/11/2022

Courses that include experiential learning through project work/field work/internship during last five years 2016-17 to 2018-19

Program name	Program code	Number of the Course that includes experiential learning through project work/field work/internship	Year of offering
Bachelor of Science	B.Sc	Physics (50/75 Marks)	2014-15
		Chemistry (50/75 Marks)	2014-15
		Botany (50/75 Marks)	2014-15
		Zoology (50/75 Marks)	2014-15
Bachelor of Arts	B.A	Geography - III Year (50 Marks)	2015-16
		Education- III Year (50 Marks)	2015-16
Bachelor of Commerce	B.Com	Firm Visits like Bank/ CA Firm	2015-16
Bachelor of Education	B. Ed.	Observation and Internship- I Year (50 Marks)	2017-18
		Internship- II Year (50 Marks)	2017-18
Master of Science	M.Sc.	Botany(50/75 Marks)	2019-20
		Zoology (50/75 Marks)	2019-20
Master of Arts	M.A	English	2019-20
		Education	2019-20
		Home Science	2019-20

Principal
प्राचार्य
कृष्णा देवी बालिका डिग्री कॉलेज
लोहियापुरम, आवास विकास, फर्रूखाबाद

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KRISHNA DEVI BALIKA DEGREE COLLEGE

LOHIAPURAM, AVAS VIKAS, FARRUKHABAD (U.P.) 209625

College Code: - FB50

Courses that include experiential learning through project work/field work/internship during last five years 2019-20 and 2020-21

Program name	Program code	Number of the Course that includes experiential learning through project work/field work/internship	Year of offering
Bachelor of Science	B.Sc	Physics (50/75 Marks)	2014-15
		Chemistry (50/75 Marks)	2014-15
		Botany (50/75 Marks)	2014-15
		Zoology (50/75 Marks)	2014-15
Bachelor of Arts	B.A	Geography - III Year (50 Marks)	2015-16
		Education- III Year (50 Marks)	2015-16
Bachelor of Commerce	B.Com	Firm Visits like Bank/ CA Firm	2015-16
Bachelor of Education	B. Ed.	Observation and Internship- I Year (50 Marks)	2017-18
		Internship- II Year (50 Marks)	2017-18
Master of Science	M.Sc.	Botany(50/75 Marks)	2019-20
		Zoology (50/75 Marks)	2019-20
Master of Arts	M.A	English	2019-20
		Education	2019-20
		Home Science	2019-20

Principal
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STATE LEVEL SYLLABUS OF SOCIOLOGY FOR UNDERGRADUATE LEVEL

B.A. I Sociology
Paper Ist: Introduction to Sociology.

Objectives:

This introductory paper is intended to acquaint the students with sociology as a social science and the distinctiveness of its approach among the social science. It is to be organized in such a way that even students without any previous exposure to sociology could acquire an interest in the subject and follow it.

Course Outline:

Unit 1: The nature of Sociology.
The meaning of Sociology: Origin, Definition, Scope, Subject matter, Nature and relation of sociology with other social Sciences. Humanistic orientation to Sociological study.

Unit 2: Basic concepts
Society, community, Institution, Association, Group, Social structure, status and role, Human and Animal Society.

Unit 3: Institutions.
Family and kinship, religion, education, State.

Unit 4: The individual and Society.
Culture, Socialization, Relation between individual and society.

Unit 5: The use of Sociology.
Introduction to applied sociology-Sociology and social problems, Ecology and Environment: Pollution, Global warming and Green house effect. Impact of Industrialization and Urbanization on Environment.

Essential readings:

Bottommore. T.B. 1972, Sociology: A guide to problems and literature. Bombay :George Allen and Unwin (India)

: Harlambos, M.1998. Sociology: Themes and perspectives. New Delhi Oxford University Press.

: Inkeles, Alex, 1987. What is Skociology? New Delhi: Prentice-Hall of India.

: Jaiaram, No. 1988 . What is Sociology .Madras:Macmillan, India

: Johnson, Harry M. 1995. Sociology: A Systematic Introduction. New Delhi , Allied Publishers.

प्राचार्य
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साहिबाबाद आवास विकास फरुखाबाद

: Schaefer, Richard T. and Robert P. Lamm. 1999 Sociology. New Delhi Tata-Mac Graw Hill.

Pedagogy:

: While introducing sociology as a social sciece emphasisshould be laid on the distinctiveness of its perspective rather than on its substantive theme of study.

: For effective teaching and meaningful learning, illustrations may be drawn from relevant empirical studies.

: Throughout the course, conscious effort should be made to drive home the relevance and significance of sociology for understanding society and in attempting to solve its problems.

Paper II nd. Society in India: Structure and Change.

Objectives :

It is presumed that student has some familiarity with Indian sociery by virtue Of the fact that he is a member of it and that he has observed and Experienced some facts of it. However this familiarity is likely to be Superficial selective and rather fragmentary. The course is aimed at recti--fying these limitations by presenting a comprehensive, integrated and empirically –based profile of Indian society.

The continuity between the present and the past is an evident feature Of Indian society. Though this continuity is reflected ink the structure of the course. The focus is on the contemporary Indian society. It is hoped that the sociological perspective on Indian society presented in this course will also enable students to gain a better understanding of their own situation and region.

Course outline:

Unit 1- The structure and composition of Indian Society: Villages, Towns, Cities, rural Urban linkages, tribes, weaker section, dalits and O.B.C.'s, women and minorities population profile and related issues.

Unit 2- Cultural and ethnic diversity, diversities in respect of language, caste, regional and religious beliefs and practices and cultural pattern .

Unit 3- Basic Institutions of Indian society: Caste, marriage, religion, class, joint family and democracy.

Unit 4- Culture: Material and Non material culture, cultural lag. Changes and transformation in Indian society ,factors affecting National integration: Regionalism Communalism and Naxalism.

Essential readings:

:: Bose, N.K. 1967, Culture and Society in India. Bombay : Asia Publishing House.

:: Bose, N.K. 1975, Structure of Hindu Society. New Delhi.

:: Dube, S.C. 1990, Society in India.(New Delhi: National Book Trust.)

:: Dube, S.C. 1995, Indian Village (London : Routledge)

:: Dube, S.C. 1958: India's changing Villages (London: Routledge and Kegan Paul).

:: Karve, Irawati, 1961 : Hindu Society : An Interpretation(Poona : Deccan-College)

:: Lannoy, Richard, 1971: The Speaking Tree : A study of Indian Society and Culture (Delhi: Oxford University Press).

:: Mandelbaum, D.G. 1970 : Society in India (Bombay: Popular Prakashan)

:: Srinivas, M.N. 1980 : India: Social Structure (New Delhi: Hindustan -Publishing Corporation)

:: Srinivas, M.N. 1963: Social Change in Modern India (California, Berkeley: University of California Press).

:: Singh, Yogendra,1973 : Modernization of Indian Tradition (Delhi: Thomson Press).

:: Uberoi, Patricia, 1993: Family, Kinship and Marriage in India (New Delhi: Oxford University Press).

Pedagogy:

:: The use of audio-visual media should be necessary and important componant of instruction.

:: The participation and involvement of students should be ensured through formal and informal discussions in the class room and field visits. They should be encouraged to write short essays on the local situation and local issues under the guidance of the teacher.

:: Wherever possible, illustrations should be drawn from the local situation .

B.A.II Sociology
Paper Ist. : Indian Society: Issues and Problems

Objectives:

Society in India today is undergoing rapid and massive changes. Many of the Changes are such that they tend to call into question the age-old social norms and practices, thus giving rise to some critical social issues and problems.

This course is designed to indentify and analyze come of such emerging Social issues and problems form sociological perspective. In the interest of systematic ordering, the issues and problems have been classified into four sets: structural, familial development and organizational.

The course seeks to go beyond the commonsense understanding of the prevailing social issues and problems in order to project them into their

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structural context. Accordingly, it focuses on their structural linkages and interrelationships.

Hence the objectives of the course are to sensitize the students to the emerging social issues and problems of contemporary India, enable them to acquire sociological understanding of these issues and problems over and above their commonsense understanding, empower them to deal with these issues and problems and to serve as change agents both in governmental and non-governmental and organizations.

Course outlines

Unit 1: STRUCTURAL: Poverty, inequality of caste and gender, Problemes of Religious, ethnic and regional, minorities,backward classes and dalits. Human Rights violation

Unit 2: FAMILIAL: Dowry, domestic violence, divorce, intra and inter-Generational conflict, problemes of elderly.

Unit 3: DEVELOPMENTAL: Development induced displacement, ecological degradation, consumerism, crisis of Values.

Unit 4: DISORGANIZATIONAL: Crime and Delinquency, White Collar crime and criminals, drug addiction, suicide, terrorism, cyber crime. Corruption in public sphere.

Essential readings:

:: Beteille,Andre, 1974, Social Inequality, New Delhi, OUP

:: Beteille, Andre, 1992, Backward classes in Contemporary India,New Delhi OUP.

:: Berreman,G.D. 1979, Caste and other inequalities: Essays in inequality, : Meerut:Folkore Institute.

:: Dube, Leela. 1997. Woman and Kinship . Comperative perspective on Gender in South and Southeast Asia. New Delhi: Sage Publications.

:: Gadgil, Madhav and Guha, Ramchandra. 1996. Ecology and Equity:The Use and abuse of nature in Contemporary India. New Delhi. OUP

:: Gill, S.S. 1998. The Pathology of Corruption . New Delhi.:

:: Guha, Ranjit, 1991. Subaltern Studies, New York: OUP

:: Inden, Ronald.1990 . Imaging India, Oxford: Brasil Blackward.

:: Lewis Oscar, 1966. "Culture of Poverty" Scientific American, Vol. II and V No. 4pp. 1925.

:: Madan, T.N. 1991, Religion in India, New Delhi. OUP

:: Ministry of Home Affairs. 1998. Crime in India. New Delhi. Govt.of India.

:: Satya Murty. T.V. 1996 Region , Religion, Caste, Gender and Culture in Contemporary India. New Delhi. OUP.

:: Sharma, S.L. 1997. " Towards Sustainable Development in India" In S.R. Mehta (Ed) , Population, Poverty, and Sustainable development, Jaipur. Rawat Publications.

:: Sharma, Ursula. 1983. Woman, Work and Property in North West India. London : Tavistock.

References:

:: Allen, Douglas (Ed).1991 . Religion and Political Conflict in South Asia, West Port Conn. : Connecticut University Press.

:: Bardhman .P.1984, Land.: Labour and Rural Poverty. New Delhi. OUP.

:: Brekenbridge, C.1996, Consuming Modernity: Public Culture in Contemporary India, New Delhi. OUP.

:: Singh, Anoop Kumar 2011. Ramification of Human Rights in India, New Delhi, Serials Publication.

:: Guha,Ramchandra .1994. Sociology and the Dilemma of Development, New Delhi: OUP

:: Juergensmeier, Mark 1993, Religious Nationalism Confronts the Secular State. New Delhi: OUP

:: Sharma, .L. 2000 Empowerment Without Antagonism: A case for Reformulation of Woman's Empowerment Approach .Sociological Bulletin. Vol.49. No.1.

:: Waxman. 1983. The Stigma of Poverty: A Critique of poverty Theories and policies.

B.A.II SOCIOLOGY
Paper II: Social Change and Social Control

Objectives:

Social change and Social Control have always been a central concern of Sociological study. So far as Social Change is concern, it has gained in saliance Partly because of its unprecedented rapidity and partly because of its planned character. The course is designed to achieve all aspect of social change as well as of Social Control .

Unit 1: Social Change: Meaning. Nature and factors of Social Change : Biological Factors. Demographic Factors, Technological Factors , Economic Factors Cultural Factors , Info-tech factors .

Unit 2: Theories of Social Change : Demographic and Biological Theories: Evolutionary, Diffusionist and Marxist theory, Technological Deterministic Theory, Linear and Cyclical theories of Social change.

Unit 3: OTHER CONCEPTS RELATING TO SOCIAL CHANGE: Social process: Industrialization, Urbanization, Mordernization and Sanskritization Social Evolution, Social Change in India

Unit 4: Social Control: Definition, Need and Importance of Social Control, Types Of Social Control, Theories of Social control
Agencies of Social Control: Family, Propaganda, Public Opinion, Education

and State, Religion.

Essential Reading :

Bottommore. T.B. 1972, SOCIOLOGY: A guide to problems and literature. Bombay : George Allen and Union (India).
Gillin and Gillin, Cultural Sociology : The Mac millan and co.New York. 1950. Kingsley Davis- Human Society, The Mac millan and co.New York. 1959.
W.E. Moore, Social Change, Prentice-Hall of India. New Delhi 1965.
Herbert Spencer; First principles, New York 1906.
W.F. Ogburn and M.F. Nimkoff: A handbook of Socioloty, Routledge and Kegan Paul Ltd. London 1960.
Maclver and Page, Society, London 1953.

B.A. III SOCIOLOGY.
Paper I – Foundations of Sociological Thought

Objectives:

Sociology originated as an intellectual response to the crisis confronting the mid nineteenth century European society. Its development over two century since then has been influenced by a variety of socio-economic and political conditions where it has been taught and practiced. It is know established as a multi-paradigmatic academic discipline, with its body of theoretical knowledge enriched and its methodological techniques and procedures systemized, Nevertheless, some of its original concerns have persisted and some of its classical theoretical and methodological landmarks are relevant even now.

This paper is intended to familiarize the students with the social, political, economic and intellectual contexts in which sociology emerged as a distinctive discipline. Its objective is to help students gain an understanding of some of the classical contributions in sociology, and their continuing relevance to its contemporary concerns.

Course Outlines :

Unit I: **The Emergence of sociology**: Transition from social philosophy to sociology- The intellectual context. Enlightenment- The social, economic and political forces : The French and Industrial Revolutions.

Unit II: The pioneers.
Comte: positivism- Spencer: Social Darwinism superorganic evolution. the classical tradition: Durkheim: social solidarity, and suicide- Weber: authority, and the concept of ideal type- Marx:materialist conception of History, Dialectical Materialism, and class struggle – Pareto: circulation of elites.

Unit III: Development of Sociological Thought in India.

Essential readings:

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Aron, Ramond. 1967(1982 reprint). Main currents in sociological thoughts (2 columes). Harmondsworth, Middlesex: Penguin Books.

Barnes, H.E. 1959. Introduction to the history to the sociology . Chicago The University of Chicago press.

Coser, Lewis A. 1979. Masters of Sociological Thought. New York : Harcourt Brance Jovanovich

Fletcher, Ronald. 1994.The Making of Sociology (2 volumes) Jaipur-Rawat.

Morrison, Ken.1995 Marx, Durkheim, Weber: Formation of Modern Social Thought. London; sage.

Ritzer, George. 1996. Sociological Theory . New Delhi. Tata-McGraw Hill.

Singh, Yogendra. 1986 Indian Sociology: social conditioning and emerging Trends. New Delhi: Vistaar.

Zeitlin, Irving.1998 (Indian Edition). Rethiking sociology: A critique of Contemporary Theory. Jiapur: Rawat.

Pedagogy:

I The focus of this paper is on the substantive, theoretical and methodological issues which shaped the thinking of pioneering and classical sociologists And which continue to concern the practitioners of sociology today. Unless Otherwise necessary to understand their contributions, the biographical Details of the sociologist should be kept to the minimum.

:: Evaluation of the relevance and significance of the contributions of the pioneers and classical theorist should be briefed by the historical context of the discipline and its theorists.

Paper IInd: Social Research Methods

Objectives:

This course aims to provide an understanding of the nature of social Phenomena, the issues involved in social research and the ways and means Of understanding and studying social reality.

Thus the emphasis is there on the study of research method as a means of understanding social reality. There are different perspectives and methods (both quantitative and qualitative research) are to be covered.

Course outline:

Unit I: Meaning, scope and significance of social research. Conceptualization and and formulation of hypothesis.

Unit II: scientific Study of social Phenomena. The scientific method, logic in social Science. Objectively and subjectivity in social science. Positivism and Phenomenology.

Unit III: Methods of Research : Quantitative- Social Survey and qualitative methods, -observation, case study, content analysis.

Unit IV: Types of Research- basic and applied, historical and empirical, Descriptive, exploratory, explanatory experimental.

Unit V: Techniques of Data Collection:- Sampling techniques, Questionnaire, schedule and interview guide, primary and secondary data.

Unit VI: Classification and presentation of data coding, tables, graphs, Measures of central tendency: Mean, Median, Mode, Standard Deviation and Dispersion.

Essential Readings:

Bajaj and Gupta. 1972, Elements of Statistics. New Delhi: R.Chand and Co.

Beteille, A. and T.N. Madan.1975, Encounter and experience: Personal Accounts of Fieldwork. New Delhi: Vikas Publishing House.

Bryman, Alan. 1988 Quality and Quantity in Social Research ,London: Unwin Hyman.

Garrett, Henry. 1981 Statistics in Psychology and Education. David Mckay. Indian Publication-Mrs. A.F.Sheikh For Vakils, Bombay, Tenth Reprint.

Jayram, N.1989. Sociology: Methods and Theory. Madras: MacMillan.

Kothari, C.R.1989. Research Methodology : Methods and Techniques, Bangalore, Wiley Eastern.

Punch, Keith. 1996. Introduction to Social Research, London: Sage.

Shipmen, Martin. 1988. The Limitations of Social Research.London Sage.

Srinivas, M.N. and A.M.Shah 1979: Fieldworker : The Field, Delhi Oxford.

Young, P.V. 1988 Scientific Social Survey and Research. New Delhi: Prentice Hall.

Pedagogy:

The uses of techniques and methods have to be understood alongwith the Perspective that governs research. An effort should be made to distinguish Between techniques and methods. Moreover, the teachers may convey the Message to the students that the social context of research and its methods Is fundamental to their understanding and application.

The purpose of the course is to train students as good research and investigators. For this reason, understanding of social reality, especially the local context, is imperative. Therefore, examples and illustrations may be drawn from local / regional contexts for effective teaching and meaningful learning.

The main efforts may be devoted to making students do exercises in the class and, if possible, in the field. This will also make the course interesting and give students the necessary practice to apply the techniques and methods in the field situations as well as for data analysis.

Students may also be familiarized with published source material especially the census reports. Use of OHP for the reading and interpretation of tables, graphs etc. will be helpful.

B.A. III – SOCIOLOGY

Paper III – PIONEERS OF INDIAN SOCIOLOGY

OBJECTIVES:

The impact of various social thoughts and philosophies is very important in The formation of Indian Society. To have a proper understanding of Indian Social system, one must be acquainted to those thoughts. India has a rich philosophical tradition. Their contributions to sociology is very remarkable In this paper the students are introduced to some of the Pioneers of Indian Sociology.

Unit I: Radha Kamel Mukerjee: Social structure of values. Social Ecology.
D.P.Mukerjee: Cultural diversities, Modernization.
Andre Betille: Social Stralification, Peasant Society and Folk Culture.

Unit II: G.S.Ghurye: Caste, Rural Urban Community.
Iravati Karve : Kinship in India.

Unit III: M.N.Srinivas: Sankritization, Secularization, and Dominant Caste.
S.C.Dubey: Indian Village, Tradition, Modernization and Development.

Unit IV: M.S.A. Rao, TK Ooman: Social Movements in India.
Yogendra Singh: Modernization of Indian Tradition,
Social change in India: Culture and resilence.

Essential readings:

Dubey, S.C.: Society in India, New Delhi.National Book Trust.
Dubey, S.C. : Indian Village, London Routledge (1995)
Dubey, S.C.: India's Changing Village, London Routledge(1958)

M.N.Srinivas: India: Social Structure New Delhi, Hindustan Publishing Corporation. 1980
M.N.Srinivas: Social Change in Modern India, California, Berkeley University of California University Press 1963.
Singh,Yogendra: Modernization of Indian Tradition Delhi: Thomson Press 1973.
Karve Irawati : Hindu Society: An interpretation. Poone. Deccan College 1961.
G.S.Ghurye : Caste , Class and occupation, Popular Prakashan Bombay-1950
G.S.Ghurye: Culture and Society. Popular Prakashan Bombay-1945

D.N.Majumdar: Races and Culture of India, Asia Publishing House, Bombay 1958.
D.P.Mukerjee: Diversities. Peoples Publishing House, Delhi-1958

Ooman,T.K. and R.N.Mukerjee: Indian Sociology : Reflections and Intro--spections, Popular Prakashan, Bombay 1986
Andre Beteille: Essays in Comparative Sociology: Oxford University Press New Delhi.
Andre Beteille: Society and Politics in India. Essays in Comparative Perspective: Oxford University Press: New Delhi.

Pedagogy:

The impact of thoughts on Indian social system must be kept in view. Particularly on contemporary system. Emphasis on present relevance is must.

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HOME SCIENCE

Course Outline

B.A. Part-I

Paper-I	Physiology/Applied Life Science	30 Marks
Paper-II	Family Resource Management & Housing	30 Marks
Paper-III	Practical	40 Marks
	Total	**100** Marks

B.A. Part-II

Paper-I	Food & Nutrition	30 Marks
Paper-II	Child Development	30 Marks
Paper-III	Practical	40 Marks
	Total	**100** Marks

B.A. Part-III

Paper-I	Textile and Clothing	50 Marks
Paper-II	Extension Education & Communication	50 Marks
Paper-III	Practical	50 Marks
	Total	**150 Marks**

Maximum Marks:

B.A. Part- I	**100**
B.A. Part- II	**100**
B.A. Part- III	**150**
Grand Total	**350**

प्राचार्य
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लहियारपुर आजमगढ़

बी0ए0 हिन्दी साहित्यद्ध पाठ्यक्रम
बी0ए0 प्रथम वर्ष

प्रथम प्रष्न पत्र : प्राचीन एवं मध्यकालीन काव्य	पूर्णांक : 50
द्वितीय प्रष्न पत्र : नाट्य साहित्य	पूर्णांक : 50

बी0ए0 द्वितीय वर्ष

प्रथम प्रष्न पत्र : आधुनिक काव्य	पूर्णांक : 50
द्वितीय प्रष्न पत्र : कथा साहित्य	पूर्णांक : 50

बी0ए0 तृतीय वर्ष

प्रथम प्रष्न पत्र : छायावादोत्तर काव्य	पूर्णांक : 50
द्वितीय प्रष्न पत्र : हिन्दी निबन्ध तथा अन्य गद्य विधायें	पूर्णांक : 50
तृतीय प्रष्न पत्र : हिन्दी की क्षेत्रीय भाषा एवं साहित्य	पूर्णांक : 50

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कृष्णा देवी बालिका डिग्री कालेज
गोरखपुर आवास विकास कालोनी

सी0एस0जे0एम0 वि0वि0 कानपुर

बी0ए0 हिन्दी पाठ्यक्रम

उद्देश्य–

- छात्रों में साहित्य को समझने, उसका आस्वादन करने तथा मूल्यांकन करने की दृष्टि बढ़ाना।
- हिंदी साहित्य की प्राचीन व आधुनिक गद्य, पद्य विधाओं का तात्विक परिचय कराना।
- साहित्यिक प्रवृत्तियों के संदर्भ में विभिन्न साहित्य विधाओं के विकासक्रम का परिचय देना।
- साहित्यिक कृतियों का विविध दृष्टियों से विवेचन–विश्लेषण, आस्वादन तथा समीक्षा करने की दृष्टि देना।
- साहित्यकारों के साहित्यिक व्यक्तित्व एवं कृतित्व का परिचय कराना तथा साहित्य के लिए उनके योगदान पर प्रकाश डालना।
- हिंदी भाषा की व्यावहारिक उपयोगिता का परिचय देना।

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लोकसागर आवास विकास फर्रुखाबाद

STATE LEVEL UNDERGRADUATE SYLLABI

B.A./B.Sc.

GEOGRAPHY

The three year B.A./B.Sc. course in geography shall be spread over three Academic Sessions viz. Part-I, Part-II, Part-III. There will be two theory papers carrying 75 marks each and a Practical of 50 marks in the first two years. In Part-III, there will be three theory papers carrying 50 marks each and a Practical of 50 marks.

The candidates must pass in theory and Practicals separately obtaining at least 36 percent marks in each. No private candidate is allowed. Failed candidates shall not be required to under go practical training. They might submit the old Record Book or a new one.

Class-wise Schedule of papers is as follows :-

B.A./ B.Sc. Part-I

Paper-	I Physical Geography	M.M. 35
Paper-	II Human Geography	M.M. 35
Practicals		M.M. 30

B.A./B.Sc. Part-II

Paper-	I Economic Geography	M.M. 35
Paper-	II Geography of India	M.M. 35
Practicals		M.M. 30

B.A./B.Sc. Part-III

Paper-	I Geographical thought	M.M. 33
Paper-	II Environmental Studies	M.M. 33
Paper-	III Regional studies of any one of the following regions:-	M.M. 34
	(A) South West Asia	
	(B) South East Asia	
	(C) Far East Asia	
Practicals		M.M. 50

प्राचार्य
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महिलाओं के आत्म विकास कार्यशाला

B.A. EDUCATION

[Bachelor of Arts in Education]

Year	Paper	Marks
B.A. I	Paper I – Principles of Education Paper II – History and Development of Indian Education	50 50
B.A. II	Paper I – Educational Psychology Paper II – Thought and Practices in Education	50 50
B.A. III	Paper I – New Dimensions in Education Paper II – Measurement and Evaluation in Education Paper III- Optional A – Educational Administration. B - Practical - Psychological Testing.	50 50 50
	Total =	350

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
महाराजगंज आजमगढ़

PROPOSED SYLLABUS FOR B.A.I, B.A.II, B.A.III—ENGLISH LITERATURE
ENGLISH LITERATURE

B.A. PART I

PAPER FIRST	**POETRY**	**50 MARKS**
PAPER SECOND	**PROSE**	**50 MARKS**

B.A.PART II

ENGLISH LITERATURE-2012-13

PAPER I DRAMA	**50 MARKS**
PAPER II FICTION	**50 MARKS**

B.A.PART III

ENGLISH LITERATURE-2013-14

PAPER 1HISTORY OF ENGLISH LITERATURE **50 MARKS**
PAPER II INDIAN ENGLISH LITERATURE

OR

INDIAN LITERATURE IN ENGLISH TRANSLATION **50 MARKS**

PAPERIII NEW LITERATURES IN ENGLISH **50 MARKS**

THE BOARD OF STUDIES IN ENGLISH ALSO RESOLVED TO EFFECT SOME MODIFICATIONS IN THE COURSE OF STUDY OF B.A.I, II, III OF ENGLISH LITERATURE IN ORDER TO MAKE THE SYLLABUS AT PAR WITH THE SYLLABUS OF OTHER UNIVERSITIES OF U.P. AND ACCORDING TO THE GUIDELINES SUGGESTED BY THE U.G.C.

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
गाजियाबाद आवास विकास फर्स्ट

संस्कृत

बी0ए0 भाग प्रथम

बी0ए0 भाग प्रथम में दो प्रश्न होंगे

प्रथम प्रश्नपत्र–नाटक एवं छन्दोऽलंकार

50 अंक

1. अभिज्ञानशाकुन्तलम – महाकवि कालिदास

   अनुवाद एवं हिन्दी व्याख्या — 20 अंक

2. संस्कृत व्याख्या — 5 अंक

3. पुस्तक से समीक्षात्मक — 5+5=10

   वस्तुनिष्ठ एवं लघुउत्तरीय प्रश्न

4. छन्दोमंजरी

   निनम्नलिखित छन्द –

   अनुष्टुप्, इन्द्रवजा, उपेन्द्रवज्रा, उपजाति वंशस्थ, — 5 अंक

   द्रुतविलम्बित, वसन्ततलिका, मन्दाक्रान्ता, शिखरिणी, शार्दूलिविक्रीडित।

5. साहित्य दर्पण – (दशम परिच्छेद) विश्वनाथ कविराज

   निम्नलिखित अलंकार –

   अनुप्रास, यमक, श्लेष, उपमा, रूपक, उत्प्रेक्षा, सन्देह, भ्रान्तिमान — 5 अंक

   विभावना।

6. नाट्य शास्त्रीय टिप्पणियां — 5 अंक

   नान्दी, सूत्रधार, प्रस्तावना नेपथ्य, आकाशभाषित विदूषक, विष्कम्भक, प्रवेशक

संस्तुत सहायक ग्रन्थ

1. अभिज्ञानशाकुन्तलम् – सं0 एम0आर0 काले चौखम्बा, वाराणसी
2. अभिज्ञानशाकुन्तलम् – डा0 दिनेश प्रसाद तिवारी
3. अभिज्ञानशाकुन्तलम् – सं0 डॉ0 हरिदत्त शस्त्री ग्रन्थम्, कानपुर
4. अभिज्ञानशाकुन्तलम् – सं0 डॉ0 कपिलदेव द्विवेदी, इलाहाबाद
5. अभिज्ञानशाकुन्तलम् – सं0 डॉ0 शिवबालक द्विवेदी, ग्रंथम, कानपुर
6. छन्दोऽलंकारदर्पण – ग्रन्थम, कानपुर

प्राचार्य

कृष्णा देवी बालिका डिग्री कालेज

लक्ष्मीपुरम भाताम विकास फतेहबाद

7. छन्दोऽलंकारप्रवेशिका – महाकाली प्रकाशन
8. साहित्य दर्पण – चौखम्बा वाराणसी
9. छन्दोमञ्जरी – चौखम्बा वाराणसी
10. श्रुतबोध – डॉ0 बृजेश कुमार शुक्ला न्यू भारतीय कारपोरेशन, दिल्ली।
11. संस्कृत साहित्य का इतिहास – डॉ0 कपिल देवी द्विवेदी–विश्वभारती अनुसंधान संस्थान, ज्ञानपुर
12. संस्कृत साहित्य का इतिहास – वाचस्पति गैरोला
13. संस्कृत साहित्य का इतिहास – ए0बी0 कीथ–मोतीलाल बनारसी दास, वाराणसी

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
माहिमापुरम आवास विकास उरवाबाजार

द्वितीय प्रश्न पत्र

काव्य, व्याकरण एवम् अनुवाद

50 अंक

1. काव्य–

संस्कृत काव्य संचयनम् अथवा संस्कृत काव्य चन्द्रिका

(i) रामायण – वाल्मीकि, किष्किन्धाकाण्ड, प्रथम सर्ग, पम्पासरोवरर्णन, श्लोक 11 से 20 तक

(ii) कुमारसम्भव – कालिदास, पञ्चम सर्ग, श्लोक 1 से 10 तक

(iii) किरातार्जुनीयम् – भारवि, प्रथम सर्ग श्लोक 1 से 10 तक

(iv) शिशुपालवधम् – माघ, प्रथम सर्ग श्लोक 1 से 10 तक

(v) उत्तर सीताचरितम्–प्रो रेवा प्रसाद द्विवेदी प्रथम सर्ग श्लोक 1 से 9 तक

(vi) वाग्वधूटीकाव्यम्–प्रो0 राजेन्द्र मिश्र वन्दे सदा स्वदेशम्

हिन्दी अनुवाद एवं व्याख्या — 16 अंक

समीक्षात्मक, वस्तुनिष्ठ एवं लघु उत्तरीय प्रश्न — 10 अंक

2. व्याकरण – लघुसिद्धान्त कौमुदी (संज्ञा, सन्धि) – वरदराज

सूत्रव्याख्या एवं सन्धि योजना — 16 अंक

3. हिन्दी से संस्कृत में अनुवाद — 8 अंक

संस्तुत सहायक ग्रन्थ

1. संस्कृत काव्यचन्द्रिका – ग्रन्थम, कानपुर
2. संस्कृत काव्य संचयन – महाकाली प्रकाशन
3. वाल्मीकि रामायण – गीता प्रेस गोरखपुर
4. कालिदास ग्रन्थावली – डा सीताराम चतुर्वेदी–उ0प्र0 संस्कृत संस्थान, लखनऊ
5. कालिदास ग्रन्थावली – डॉ0 रेवा प्रसाद द्विवेदी
6. किरातार्जुनीयम् – सं0 शेषराज शर्मा रेग्मी
7. किरातार्जुनीयम् (प्रथम सर्ग) – ग्रन्थम् कानपुर
8. शिशुपालवधम् – सं0 राम प्रताप त्रिपाठी शास्त्री

प्राचार्य
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जाहिदापुरम आवास विकास फर्रुखाबाद

9. उत्तर सीता चरितम् — डा0 कपिलदेव द्विवेदी
10. वाग्वधूटी काव्यम् — प्रो0 राजेन्द्र मिश्रा
11. लघुसिद्धान्तकौमुदी — धरानन्द शास्त्री, मोतीलाल बनारसीदास वाराणसी
12. लघुसिद्धान्तकौमुदी (संज्ञासन्धि प्रकरण) — डा0 विश्वम्भरनाथ द्विवेदी
13. संज्ञासन्धि प्रकरण — डा0 दिनेश प्रसाद तिवारी—महाकाली प्रकाशन
14. संस्कृत रचना अनुवाद कौमुदी— डॉ0 कपिल देव द्विवेदी—विश्वभारती अनुसंधान केन्द्र ज्ञानपुर
15. अनुवाद चंदिका — चक्रधर नौटियाल—मोतीलाल बनारसीदास वाराणसी
16. संस्कृत अनुवाद दीपिका — डॉ0 हरिदत्त शास्त्री
17. संज्ञा सन्धि प्रकरण — प्रो0 राजेन्द्र मिश्र

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
पडियापुरम भाटापार, ठिकास फरेन्द्रानगर

संस्कृत
बी0ए0 भाग द्वितीय
बी0ए0 भाग द्वितीय में दो प्रश्न पत्र होंगे
प्रथम प्रश्नपत्र–वेद उपनिषद एवं व्याकरण

50 अंक

1. वेद

(क) ऋग्वेद – अग्निसूक्त 1/1, पुरूष सूक्त, 10/90 वाक् सूक्त 10/125

(ख) शुक्ल यजुर्वेद – शिवसंकल्प सूक्त (1 से 6 मंत्र)

(ग) अथर्ववेद – पृथिवीसूक्त (1 से 10 मन्त्र)

हिन्दी अनुवाद एवं व्याख्या — 15 अंक

समीक्षात्मक, वस्तुनिष्ठ एवं लघुउत्तरीय प्रश्न — 10 अक

2. कठोपनिषद् (प्रथम अध्याय)

हिन्दी अनुवाद एवं व्याख्या — 10 अंक

समीक्षात्मक, वस्तुनिष्ठ एवं लघुउत्तरीय प्रश्न — 5 अंक

3. लघुसिद्धान्तकौमुदी – वरदाज

अजन्तप्रकरण

राम, हरि, रमा, भानु

रूपसिद्धि एवं सम्बन्धित सूत्रों की व्याख्या — 10 अंक

संस्तुत सहायक ग्रन्थ–

1. ऋग्वेद सं0 युधिष्ठिर मीमांसक
2. वेदमंजरी – महाकाली प्रकाशन
3. वेदामृतम् – ग्रन्थम्
4. कठोपनिषद् – गीताप्रेस गोरखपुर
5. लघुसिद्धान्तकौमुदी (अजन्त प्रकारण) – डॉ0 शिवबालक द्विवेदी
6. लघुसिद्धान्त कौमुदी – महाकाली प्रकाशन
7. वैदिक साहित्य और संस्कृति – पं0 बलदेव उपाध्याय – चौखम्बा वाराणसी
8. संस्कृत वाङ्मय का वृहद् इतिहास – प्रथम खण्ड (वेद) उ0प्र0 संस्कृत संस्थानम् लखनऊ।
9. मध्य सिद्धान्त कौमुदी (अजन्त, पुल्लिंग, स्त्रीलिंग, नपुंसकलिंग)–डॉ0 बृजेश कुमार शुक्ला रायल बुक डिपो, लखनऊ।

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
नारिवापुरम आवास विकास कानपुर

बी0ए0 भाग द्वितीय

द्वितीय प्रश्न पत्र

गद्य, गद्य साहित्य का इतिहास एवं निबन्ध

50 अंक

1. शुकनासोपदेश – बाणभट्ट
   हिन्दी अनुवाद एवं व्याख्या 10 अंक
2. शिवराजविजय (प्रथम निश्वास) – पं0 अम्बिकादत्त व्यास
   हिन्दी अनुवाद एवं व्याख्या 10 अंक
3. उपरिलिखित पुस्तकों पर समीक्षात्मक, वस्तुनिष्ठ एवं दीर्घ उत्तरीय प्रश्न 10 अंक
4. संस्कृत गद्य साहित्य का इतिहास 10 अंक
5. निबन्ध (संस्कृत में) 10 अंक

संस्तुत सहायक ग्रन्थ–

1. शुकनासोपदेश – चौखम्बा विद्याभवन प्रकाशन वाराणसी
2. शुकनासोपदेश – महाकाली प्रकाशन
3. शुकनासोपदेश – ग्रन्थम्
4. शिवराजविजयः
   प्रथम निश्वास – ग्रन्थम्, कानपुर
5. शिवराजविजयः – प्रो0 ओम प्रकाश पाण्डेय
6. संस्कृत साहित्य का इतिहास – ए.बी0 कीथ मोती लाल बनारसीदास चौखम्बा प्रकाशन वाराणसी
7. संस्कृत साहित्य का इतिहास – वाचस्पति गैरोला चौखम्बा विद्या भवन वाराणसी।
8. संस्कृत साहित्य का इतिहास – डा0 बलदेव उपाध्याय चौखम्बा संस्कृत सिरीज आफिस
9. सस्कृत निबन्ध चन्द्रिका – ग्रन्थम, कानपुर
10. सस्कृत निबन्ध नवनीतम् – डॉ0 कपिलदेव द्विवेदी–विश्वभारती अनुसंधान संस्थान ज्ञानपुर

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
[illegible] आनन्द विकास [illegible]

संस्कृत

बी0ए0 भाग तृतीय

बी0ए0 भाग तृतीय में तीन प्रश्न पत्र होगें। तृतीय प्रश्न पत्र का वैकल्पिक प्रश्न प्रत्र संस्कृत संरचना एवं मौखिकी होगा।

प्रथम प्रश्नपत्र

काव्य एवं काव्यशास्त्र

	50 अंक
1. नीतिशतक–भर्तृहरि (1 से 30 श्लोक) हिन्दी अनुवाद एवं व्याख्या	15 अंक
2. भामिनीविलास–पण्डितराज जगन्नाथ (1 से 30 श्लोक) उपरिलिखित हिन्दी अनुवाद एवं व्याख्या	15 अंक
3. समीक्षात्मक, वस्तुनिष्ठ एवं लघु उत्तरीय प्रश्न	10 अंक
4. साहित्यदर्पण–विश्वनाथ कविराज प्रथम परिच्छेद	10 अंक

संस्तुत सहायक ग्रन्थ

1. नीतिशतकम् –ग्रन्थ, कानपुर
2. नीतिशतकम् –चौखम्बा, वाराणसी
3. नीतिशतकम् –सं0 डॉ0 महेशनाथ चतुर्वेदी
4. भामिनीविलासः –सं0 डॉ0 शिवबालक द्विवेदी
5. भामिनीविलास –सं0 डॉ रेखा शुक्ला–चौखम्बा संस्कृत सीरीज ऑफिस, वाराणसी।
6. साहित्यदर्पण –चौखम्बा वाराणसी
7. साहित्य दर्पण–प्रकाश –ग्रन्थम, कानपुर

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महियापुर आजमगढ़

द्वितीय प्रश्नपत्र
नाटक, काव्य व्याकरण एवं निबन्ध

50 अंक

1. स्वप्नवासवदत्तम – भास — 10 अंक
   अनुवाद एवं व्याख्या
2. बुद्धचरितम् प्रथम सर्ग (1–50 श्लोक)
   अनुवाद एवं व्याख्या — 10 अंक
3. उपरिलिखित पुस्तकों से समीक्षात्मक,
   वस्तुनिष्ठ एवं लघुउत्तरीय प्रश्न — 10 अंक
4. लघुसिद्धान्त कौमुदी – वरदराज (समाज एवं विभक्त्यर्थ)
   रूपसिद्धि मात्र — 10 अंक
5. निबन्ध (संस्कृत में) — 10 अंक

संस्तुत सहायक गन्थ

1. स्वप्नवासवदत्तम् – चौखम्बा, वाराणसी
2. स्वप्नवासवदत्तम् – डॉ0 दिनेश प्रसाद तिवारी–महाकाली प्रकाशन
3. बुद्धचरितम् (प्रथम सर्ग) – ग्रन्थम, कानपुर
4. बुद्धचरितम् (प्रथम सर्ग) – डॉ0 शील निगम–ग्रन्थम कानपुर
5. लघुसिद्धान्तकौमुदी (समास एवं विभक्त्यर्थ)– महाकाली प्रकाशन
6. लघुसिद्धान्तकौमुदी (समास एवं विभक्त्यर्थ)– डॉ0 शिवबालक द्विवेदी
7. निबन्धादर्शः – म0म0 गिरिधर शर्मा चतुर्वेदी
8. निबन्धकुसुमांजलिः – डॉ0 जयन्त मिश्रा
9. बुद्धचरितम् – महाकाली प्रकाशन, कानपुर
10. बुद्धचरितम् – महन्त श्रीराम चन्द्र दास शास्त्री चौखम्बा विद्याभवन
11. संस्कृत निबन्ध चन्द्रिका – ग्रन्थम् कानपुर

द्विवेदी

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
बोन्सीपुरवा, अलाम विकास गोरखपुर

तृतीय प्रश्नपत्र
दर्शन, संस्कृति एवं संस्कृत साहित्य का इतिहास

50 अंक

1. श्रीमद्भगवद्गीता (द्वितीय अध्याय)
   हिन्दी अनुवाद एवं व्याख्या — 10 अंक
2. ईशावास्योपनिषद् (विस्तृत व्याख्या) — 10 अंक
3. भारतीय दर्शन–सामान्य परिचय — 10 अंक
4. भारतीय संस्कृति — 10 अंक
   संस्कृति का स्वरूप, वर्णाश्रमव्यवस्था, संस्कार
   एवं पुरूषार्थचतुष्टय
5. संस्कृत साहित्य का इतिहास — 10 अंक
   महाकाव्य, नाटक एवं गीतिकाव्य
   का सामान्य परिचय

संस्तुत सहायक ग्रन्थ

1. श्रीमद्भगवद्गीता – गीता प्रेस, गोरखपुर
2. श्रीमद्भगवद्गीता (द्वितीय अध्याय) – ग्रन्थम, कानपुर
3. श्रीमद्भगवद्गीता (द्वितीय अध्याय) – प्रो आद्याप्रसाद मिश्र
4. ईशावास्योपनिषद् – गीता प्रेस, गोरखपुर
5. भारतीय दर्शन – पं0 बलदेव उपाध्याय चौखम्बा प्रेस वाराणसी
6. षड्दर्शन – ग्रन्थम, कानपुर
7. ईशावास्योपनिनषद् – प्रो आद्याप्रसाद मिश्र, इलाहाबाद
8. ईशावास्योपनिनषद् – डॉ0 शिवबालक द्विवेदी, ग्रन्थम् कानपुर

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
जाहिदपुरम आवास विकास फतेहगंज

9. ईशावास्योपनिनषद् – महाकाली प्रकाशन

10. भरतीय संस्कृति के प्रमुख सोपान– डॉ0 दिनेश प्रसाद तिवारी महाकाली प्रकाशन

11. भारतीय संस्कृति – डॉ0 शिवबालक द्विवेदी, ग्रन्थम् कानपुर

12. संस्कृत साहित्य का इतिहास – मैक्डानल, अनुवादक–श्री चारूदत्त शास्त्री वाराणसी

13. संस्कृत साहित्य का इतिहास – डॉ0 राजवंश सहाय हीरा चौखम्बा प्रेस वाराणसी

14. संस्कृत साहित्य का इतिहास – श्री वाचस्पति गैरोला चौखम्बा प्रकाशन वाराणसी

15. संस्कृत साहित्य का इतिहास – डॉ0 शिवबालक द्विवेदी, ग्रन्थम् कानपुर

16. संस्कृत साहित्य की रूपरेखा – पं0 चन्द्रशेखर पाण्डेय एवं व्यास–साहित्य निकेतन, कानपुर

17. संस्कृत वाङ्मय का विवेचनात्मक इतिहास– डॉ0 सूर्यकान्त चौखम्बा वाराणसी

18. भारतीय दर्शन विशद विवेचन – डॉ0 गीता शुक्ला, युवराज प्रकाशन आगरा

अथवा

संस्कृत संरचना एवं मौखिकी	–	50 अंक
(क) संस्कृत परियोजना (प्रोजेक्ट)	–	25 अंक
(ख) मौखिकी	–	25 अंक

प्राचार्य

कृष्णा देवी बालिका डिग्री कालेज
लखीमपुर खीरी विकास खण्ड

Revised Syllabus of Zoology2017 Onwards

CSJM UNIVERSITY KANPUR
Syllabus of Zoology
(B.Sc. I, II, & III year)

Following Major title of papers of B.Sc. I, II, and III were finalized with their contents:

Theory Paper's duration is of Three hours (except MCQ paper where duration is two hours only) and duration of practical assessment is Four hours.

B.Sc. I

Papers	Papers Title of paper	Max Marks
Paper I	Lower Non Chordata (Protozoa- Helminths)	50
Paper II	Higher Non Chordata (Annelida-Echinodermata)	50
Paper III	Cell Biology and Genetics	50
Practical	Practical Syllabus based on theory papers	50

B.Sc. II

Papers	Title of paper	Max. Marks
Paper I	Chordata	50
Paper II	Animal distribution, Evolution and Developmental Biology	50
Paper III	Physiology and Biochemistry	50
Practical	Practical Syllabus based on theory papers	50

B.Sc. III

Papers	Title of paper	Max. Marks
Paper I	Applied and Economic Zoology	75
Paper II	Biotechnology, Immunology, Biological Tools & Techniques and Biostatistics	75
Paper III	Ecology, Microbiology, Animal Behavior, Pollution and Toxicology	75
Practical	Practical Syllabus based on theory papers	75

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
मोतियापुरा आवास विकास कानपुर

PROPOSED UNIFORM SYLLABUS FOR

U.P. STATE UNIVERSITIES

Three Years Degree Course

PHYSICS

B.Sc.- FIRST YEAR

		Max. Marks
PAPER I	MECHANICS AND WAVE MOTION	50
PAPER II	KINETIC THEORY AND THERMODYNAMICS	50
PAPER III	CIRCUIT FUNDAMENTALS AND BASIC ELECTRONICS	50
PRACTICAL	TWO PRACTICALS (30 MARKS) + VIVA (10 MARKS) + RECORD (10 MARKS)	50
TOTAL		200

Candidate must obtain minimum pass marks in Theory and Practical Examinations separately.

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
नरियापुरम आवास विकास फतेहपुर

PHYSICS

B.Sc.- SECOND YEAR

		Max. Marks
PAPER I	PHYSICAL OPTICS AND LASERS	50
PAPER II	ELECTROMAGNETICS	50
PAPER III	ELEMENTS OF QUANTUM MECHANICS, ATOMIC AND MOLECULARS SPECTRA	50
PRACTICAL	TWO PRACTICALS (30 MARKS) + VIVA (10 MARKS) + RECORD (10 MARKS)	50
TOTAL		200

Candidate must obtain minimum pass marks in Theory and Practical Examinations separately.

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
बोहिरापुरम आवास विकास फतेहगढ़

PHYSICS

B.Sc.- THIRD YEAR

		Max. Marks
PAPER I	RELATIVITY AND STATISTICAL PHYSICS	75
PAPER II	SOLID STATE AND NUCLEAR PHYSICS	75
PAPER III	SOLID STATE ELECTRONICS	75
PRACTICAL	TWO PRACTICALS (50 MARKS) + VIVA (15 MARKS) + RECORD (10 MARKS)	75
TOTAL		300

Candidate must obtain minimum pass marks in Theory and Practical Examinations separately.

प्राचार्य
कृष्णा देवी बालिका डिग्री कालेज
नरिंगापुरम आजाम विकास फतेहगंज

RECOMMENDED UNIFIED SYLLABUS OF MATHEMATICS

For B.A./B.Sc. Classes

(From 2011-12 onwards)

B.A./B.Sc. I

Paper I : ALGEBRA and TRIGONOMETRY M.M. : 33/65

Algebra

Unit 1. Sequence and its convergence (basic idea), Convergence of infinite series, Comparison test, ratio test, root test, Raabe's test, Logarithmic ratio test, Cauchy's condensation test, DeMorgan and Bertrand test and higher logarithmic ratio test. Alternating series, Leibnitz test, Absolute and conditional convergence, Congruence modulo m relation, Equivalence relations and partitions.

Unit 2. Definition of a group with examples and simple properties, Permutation groups, Subgroups, Centre and normalizer, Cyclic groups, Coset decomposition, Lagrange's theorem and its consequences.

Unit 3. Homomorphism and isomorphism, Cayley's theorem, Normal subgroups, Quotient group, Fundamental theorem of homomorphism, Conjugacy relation, Class equation, Direct product.

Unit 4. Introduction to rings, subrings, integral domains and fields, Characteristic of a ring, Homomorphism of rings, Ideals, Quotient rings.

Trigonometry

Unit 5. Complex functions and separation into real and imaginary parts, Exponential, direct and inverse trigonometric and hyperbolic functions, logarithmic function, Gregory's series, Summation of series.

Paper II : CALCULUS M.M. : 33/65

Differential Calculus

Unit 1. ε–δ definition of the limit of a function, Continuous functions and classification of discontinuities, Differentiability, Chain rule of differentiability, Rolle's theorem, First and second mean value theorems, Taylor's theorems with Lagrange's and Cauchy's forms of remainder, Successive differentiation and Leibnitz's theorem.

Unit 2. Expansion of functions (in Taylor's and Maclaurin's series), Indeterminate forms, Partial differentiation and Euler's theorem, Jacobians.

Unit 3. Maxima and Minima (for functions of two variables), Tangents and normals (polar form only), Curvature, Envelopes and evolutes.

Unit 4(*a*). Asymptotes, Tests for concavity and convexity, Points of inflexion, Multiple points, Tracing of curves in Cartesian and polar co-ordinates.

Integral Calculus

Unit 4(*b*). Reduction formulae, Beta and Gamma functions.

Unit 5. Qudrature, Rectification, Volumes and surfaces of solids of revolution, Pappus

theorem, Double and triple integrals, Change of order of integration, Dirichlet's and Liouville's integral formulae.

Paper III : GEOMETRY and VECTOR CALCULUS M.M. : 34/70

Geometry

Unit 1. General equation of second degree, Tracing of conics, System of conics, Confocal conics, Polar equation of a conic and its properties.

Unit 2. Three dimensional system of co-ordinates, Projection and direction cosines, Plane, Straight line.

Unit 3. Sphere, cone and cylinder.

Unit 4. Central conicoids, Reduction of general equation of second degree, Tangent plane and normal to a conicoid, Pole and polar, Conjugate diameters, Generating lines, Plane sections.

Vector Calculus

Unit 5. Vector differentiation and integration, Gradient, divergence and curl and their properties, Line integrals, Theorems of Gauss, Green and Stokes and problems based on these.

B.A./B.Sc. II

(From 2012-13 onwards)

Paper I : LINEAR ALGEBRA and MATRICES M.M. : 33/65

Linear Algebra

Unit 1. Vector spaces and their elementary properties, Subspaces, Linear dependence and independence, Basis and dimension, Direct sum, Quotient space.

Unit 2. Linear transformations and their algebra, Range and null space, Rank and nullity, Matrix representation of linear transformations, Change of basis.

Unit 3. Linear functionals, Dual space, Bi-dual space, Natural isomorphism, Annihilators, Bilinear and quadratic forms, Inner product spaces, Cauchy-Schwarz's inequality, Bessel's inequality and orthogonality.

Matrices

Unit 4. Symmetric and skew-symmetric matrices, Hermitian and skew-Hermitian matrices, Orthogonal and unitary matrices, Triangular and diagonal matrices, Rank of a matrix, Elementary transformations, Echelon and normal forms, Inverse of a matrix by elementary transformations.

Unit 5. Characteristic equation, Eigen values and eigen vectors of a matrix, Cayley-Hamilton's theorem and its use in finding inverse of a matrix, Application of matrices to solve a system of linear (both homogeneous and non-homogeneous) equations, Consistency and general solution, Diagonalization of square matrices with distinct eigen values, Quadratic forms.

Paper II : DIFFERENTIAL EQUATIONS and INTEGRAL TRANSFORMS

M.M. : 33/65

Differential Equations

Unit 1. Formation of a differential equation (D.E.), Degree, order and solution of a D.E., Equations of first order and first degree : Separation of variables method, Solution of homogeneous equations, linear equations and exact equations, Linear differential equations with constant coefficients, Homogeneous linear differential equations,

Unit 2. Differential equations of the first order but not of the first degree, Clairaut's equations and singular solutions, Orthogonal trajectories, Simultaneous linear differential equations with constant coefficients, Linear differential equations of the second order (including the method of variation of parameters),

Unit 3. Series solutions of second order differential equations, Legendre and Bessel functions (P_n and J_n only) and their properties.

Order, degree and formation of partial differential equations, Partial differential equations of the first order, Lagrange's equations, Charpit's general method, Linear partial differential equations with constant coefficients.

Unit 4(*i*). Partial differential equations of the second order, Monge's method.

Integral Transforms

Unit 4(*ii*). The concept of transform, Integral transforms and kernel, Linearity property of transforms, Laplace transform, Inverse Laplace transform, Convolution theorem, Applications of Laplace transform to solve ordinary differential equations.

Unit 5. Fourier transforms (finite and infinite), Fourier integral, Applications of Fourier transform to boundary value problems, Fourier series.

Paper III : MECHANICS

Dynamics M.M. : 34/70

Unit 1. Velocity and acceleration along radial and transverse directions, and along tangential and normal directions, Simple harmonic motion, Motion under other laws of forces, Earth attraction, Elastic strings.

Unit 2. Motion in resisting medium, Constrained motion (circular and cycloidal only).

Unit 3. Motion on smooth and rough plane curves, Rocket motion, Central orbits and Kepler's law, Motion of a particle in three dimensions.

Statics

Unit 4. Common catenary, Centre of gravity, Stable and unstable equilibrium, Virtual work.

Unit 5. Forces in three dimensions, Poinsot's central axis, Wrenches, Null line and null plane.

B.A./B.Sc. III

(From 2013-14 onwards)

Paper I : REAL ANALYSIS M.M. : 36/75

Unit 1. Axiomatic study of real numbers, Completeness property in R, Archimedean property, Countable and uncountable sets, Neighbourhood, Interior points, Limit points, Open and closed sets, Derived sets, Dense sets, Perfect sets, Bolzano-Weierstrass theorem.

Unit 2. Sequences of real numbers, Subsequences, Bounded and monotonic sequences, Convergent sequences, Cauchy's theorems on limit, Cauchy sequence, Cauchy's general principle of convergence, Uniform convergence of sequences and series of functions, Weierstrass M-test, Abel's and Dirichlet's tests.

Unit 3. Sequential continuity, Boundeness and intermediate value properties of continuous functions, Uniform continuity, Meaning of sign of derivative, Darboux theorem.

Limit and continuity of functions of two variables, Taylor's theorem for functions of two variables, Maxima and minima of functions of three variables, Lagrange's method of undetermined multipliers.

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[illegible] आतम विकास [illegible]

Unit 4. Riemann integral, Integrability of continuous and monotonic functions, Fundamental theorem of integral calculus, Mean value theorems of integral calculus, Improper integrals and their convergence, Comparison test, μ-test, Abel's test, Dirichlet's test, Integral as a function of a parameter and its differentiability and integrability.

Unit 5. Definition and examples of metric spaces, Neighbourhoods, Interior points, Limit points, Open and closed sets, Subspaces, Convergent and Cauchy sequences, Completeness, Cantor's intersection theorem.

Paper II : COMPLEX ANALYSIS M.M. : 36/75

Unit 1. Functions of a complex variable, Concepts of limit, continuity and differentiability of complex functions, Analytic functions, Cauchy-Riemann equations (Cartesian and polar form), Harmonic functions, Orthogonal system, Power series as an analytic function.

Unit 2. Elementary functions, Mapping by elementary functions, Linear and bilinear transformations, Fixed points, Cross ratio, Inverse points and critical points, Conformal transformations.

Unit 3. Complex Integration, Line integral, Cauchy's fundamental theorem, Cauchy's integral formula, Morera's theorem, Liouville theorem, Maximum Modulus theorem, Taylor and Laurent series.

Unit 4. Singularities and zeros of an analytic function, Rouche's theorem, Fundamental theorem of algebra, Analytic continuation.

Unit 5. Residue theorem and its applications to the evaluation of definite integrals, Argument principle.

Paper III : NUMERICAL ANALYSIS and PROGRAMMING IN *C*

Numerical Analysis M.M. : 36/75

Unit 1. Shift operator, Forward and backward difference operators and their relationships, Fundamental theorem of difference calculus, Interpolation, Newton-Gregory's forward and backward interpolation formulae.

Unit 2. Divided differences, Newton's divided difference formula, Lagrange's interpolation formula, Central differences, Formulae based on central differences : Gauss, Striling's, Bessel's and Everett's interpolation formulae, Numerical differentiation.

Unit 3. Numerical integration, General quadrature formula, Trapezoidal and Simpson's rules, Weddle's rule, Cote's formula, Numerical solution of first order differential equations : Euler's method, Picard's method, Runge-Kutta method and Milne's method, Numerical solution of linear, homogeneous and simultaneous difference equations, Generating function method.

Unit 4. Solution of transcendental and polynomial equations by iteration, bisection, Regula-Falsi and Newton-Raphson methods, Algebraic eigen value problems : Power method, Jacobi's method, Given's method, Householder's method and *Q-R* method, Approximation : Different types of approximations, Least square polynomial approximation, Polynomial approximation using orthogonal polynomials, Legendre approximation, Approximation with trigonometric functions, exponential functions, rational functions, Chebyshev polynomials.

Programming in C

Unit 5. Programmer's model of computer, Algorithms, Data type, Arithmetic and input/out instruction, Decisions, Control structures, Decision statements, Logical and

conditional operators, Loop case control structures, Functions, Recursion, Preprocessors, Arrays, Puppetting of strings Structures, Pointers, File formatting.

OPTIONAL PAPER

Any one of the following papers : M.M. : 42/75

Paper IV(*a*) : NUMBER THEORY and CRYPTOGRAPHY

Unit 1. Divisibility : gcd, lcm, prime numbers, fundamental theorem of arithmetic, perfect numbers, floor and ceiling functions, Congruence : properties, complete and reduced residue systems, Fermat's theorem, Euler functions, Chinese remaineder theorem.

Unit 2. Primality testing and factorization algorithms, Pseudo-primes, Fermat's pseudo-primes, Pollard's rho method for factorization.

Unit 3. Introduction to cryptography : Attacks, services and mechanisms, Security services, Conventional encryption - Classical techniques : Model, Stegnanography, Classical encryption technique, Modern techniques : DES, cryptanalysis, block cipher principles and design, Key distribution problem, Random number generation.

Unit 4. Hash functions, Public key cryptography, Diffie-Hellmann key exchange, Discrete logarithm-based crypto-systems, RSA crypto-system, Signature schemes, Digital signature standard (DSA), RSA signature schemes, Knapsack problem.

Unit 5. Elliptic curve cryptography : Introduction to elliptic curves, Group structure, Rational points on elliptic curves, Elliptic curve cryptography, Applications in cryptography and factorization, Known attacks.

Paper IV(*b*) : LINEAR PROGRAMMING

Unit 1. Linear programming problems, Statement and formation of general linear programming problems, Graphical method, Slack, and surplus variables, Standard and matrix forms of linear programming problem, Basic feasible solution.

Unit 2. Convex sets, Fundamental theorem of linear programming, Simplex method, Artificial variables, Big-*M* method, Two phase method.

Unit 3. Resolution of degeneracy, Revised simplex method, Sensitivity Analysis.

Unit 4. Duality in linear programming problems, Dual simplex method, Primal-dual method Integer programming.

Unit 5. Transportation problems, Assignment problems.

Paper IV(*c*) : DIFFERENTIAL GEOMETRY and TENSOR ANALYSIS

Differential Geometry

Unit 1. Local theory of curves- Space curves, Examples, Plane curves, tangent and normal and binormal, Osculating plane, normal plane and rectifying plane, Helices, Serret-Frenet apparatus, contact between curve and surfaces, tangent surfaces, involutes and evolutes of curves, Intrinsic equations, fundamental existence theorem for space curves, Local theory of surfaces- Parametric patches on surface curve of a surface, surfaces of revolutions, Helicoids, metric-first fundamental form and arc length.

Unit 2. Local theory of surfaces (Contd.), Direction coefficients, families of curves, intrinsic properties, geodesics, canonical geodesic equations, normal properties of geodesics, geodesics curvature, geodesics polars, Gauss-Bonnet theorem, Gaussian curvature, normal curvature, Meusneir's theorem, mean curvature, Gaussian curvature, umbilic points, lines of curvature, Rodrigue's formula, Euler's theorem.

Unit 3. The fundamental equation of surface theory – The equation of Gauss, the

equation of Weingarten, the Mainardi-Codazzi equation, Tensor algebra : Vector spaces, the dual spaces, tensor product of vector spaces, transformation formulae, contraction, special tensor, inner product, associated tensor.

Unit 4. Differential Manifold-examples, tangent vectors, connexions, covariant differentiation. Elements of general Riemannian geometry-Riemannian metric, the fundamental theorem of local Riemannian Geometry, Differential parameters, curvature tensor, Geodesics, geodesics curvature, geometrical interpretation of the curvature tensor and special Riemannian spaces.

Tensor Analysis

Unit 5. Contravariant and covariant vectors and tensors, Mixed tensors, Symmetric and skew-symmetric tensors, Algebra of tensors, Contraction and inner product, Quotient theorem, Reciprocal tensors, Christoffel's symbols, Covariant differentiation, Gradient, divergence and curl in tensor notation.

Paper IV(*d*) : PRINCIPLES OF COMPUTER SCIENCE

Unit 1. Data Storage - Storage of bits, main memory, mass storage, Information of storage, The binary system, Storing integers, stroring fractions, communication errors.

Data Manipulations - The central processing unit, The stored program concept, Programme execution, Other Architectures, arithmetic/logic instructions, Computer – peripheral communication.

Unit 2. Operating System and Network – The evolution of operating system, Operating system architecture, Coordinating the machine's activates, Handling competition among process, networks, network protocol.

Unit 3. Algorithms - The concept of an algorithm, Algorithm representation, Algorithm, Discovery, Iterative structure, Recursive structures, Efficiency and correctness, (algorithm to be implemented in C++).

Unit 4. Programming Languages - Historical perspective, Traditional programming Concepts, Program units, Languages implementation, Parallel computing, Declarative computing.

Unit 5. Software Engineering - The software engineering discipline, The software life cycle, Modularity, Development, Tools and techniques, Documentation, Software ownership and liability. **Data Structures** - Array, Lists, Stack, Queues, Trees, Customised data types, Object-oriented.

Paper IV(*e*) : DISCRETE MATHEMATICS

Unit 1. Propositional Logic - Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradiction, normal forms (conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification.

Method of Proof - Mathematical induction, proof by implication, converse, inverse, contrapositive, negation, and contradiction, direct proof by using truth table, proof by counter example.

Unit 2. Relation - Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation.

Posets, Hasse Diagram and Lattices - Introduction, ordered set, Hasse diagram of partially ordered set, isomorphic ordered set, well ordered set, properties of lattices, and complemented lattices.

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लहियापुरवा आजमगढ़

Boolean Algebra - Basic definitions, Sum of products and product of sums, Logic gates and Karnaugh maps.

Unit 3. Graphs - Simple graph, multi graph, graph terminology, representation of graphs, Bipartite, regular, planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph colouring, chromatic number, isomorphism and homomorphism of graphs.

Tree - Definition, Rooted tree, properties of trees, binary search tree, tree traversal.

Unit 4. Combinatorics - Basics of counting, permutations, combinations, inclusion-exclusion, recurrence relations (n^{th} order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relations), generating function (closed form expression, properties of G.F., solution of recurrence relation using, G.F, solution of combinatorial problem using G.F.).

Unit 5. Finite Automata - Basic concepts of automation theory, Deterministic finite automation (DFA), transition function, transition table, Non deterministic finite automata (NDFA), Mealy and Moore machine, Minimization of finite automation.

Paper IV(*b*) : MATHEMATICAL STATISTICS

Probability Theory

Unit 1. Three definitions of probability (Mathematical, Empirical & axiomatic). Dependent, independent and compound events.

Addition and multiplication theorems of probability, conditional probability. Bionomial and multinomial theorems of probability, Baye's theorem, Mathematical expectation and its properties, Moment generating functions (m.g.f.) and cumulants.

Distributions

Unit 2. Discrete distributions – Binomial & Poisson distributions and their properties.

Continuous distributions – Distribution function, Probability density function (Pdf), Cauchy's distribution, rectangular distribution, exponential distribution, Beta, Gamma Normal distributions and their properties.

Fitting of the Curves by method of least square – Straight line, parabola and exponential curves.

Correlation and Regression

Unit 3. Bivariate population, Meaning of correlation & regression. Coefficient of Correlation, rank correlation, lines of regression. Properties of regression coefficients, Partial and multiple correlation and their simple Properties.

Sampling Theory

Unit 4. Types of population, Parameters & Statistics, Null Hypothesis, Level of Significance, critical region. Procedure for testing Hypothesis. Type I & Type II error, χ^2 - distribution and its properties.

Unit 5. Simple and random sampling. Test of significance for large samples. Sampling distribution of Mean. Standard error, Test of significance based on χ^2. Test of significance based on t,F & Z distribution, ANOVA.

Proposed Syllabus for B.Sc. Botany
B.Sc. I year

There will be Three theory papers and a practical examination as follows:

Paper I	- Diversity of Viruses, Bacteria & Fungi	M. M.: 50
Paper II	- Diversity of Algae, Lichens, & Bryophytes	M. M.: 50
Paper III	- Diversity of Pteridophytes & Gymnosperms	M. M.: 50

(There will be 9 questions in each paper and candidate has to attempt only 5 questions. Q.1 will be compulsory based on units I - IV and of short answer type. Two questions will be set from each unit of which one question has to be attempted. All questions will carry equal marks.

Practicals: Based on papers I - III M. M.: 50

The course detailes are as follows:-

Paper I: Diversity of Viruses, Bacteria, & Fungi M.M. 50

Unit-I

History, nature and classification of Viruses, Bacteria and Fungi Whittaker's 5 kingdom classification,

History of virology and bacteriology; prokaryotic and eukaryotic cell structure structure, classification and nature of viruses; structure and classification (based on cell structure) of bacteria; classification, thallus organisation and reproduction in fungi; economic importance of fungi.

Unit-II

Viruses: Symptoms of virus infection in plants; transmission of plant viruses; genome organisation, replication of plant virus (tobacco mosaic virus); structure and multiplication of bacteriophages; structure and multiplication of viroids and prions.

Unit-III

Bacteria: Nutritional types of bacteria (based on carbon and energy sources), metabolism in different nutritional types bacterial genome and plasmids; reproduction, variability in bacteria - mutation, staining; economic importance.

Unit-IV

Fungi: The characteristics and life cycles of the following:

Mastigomycotina: *Albugo, Pythium,;Phytopthora* **Ascomycotina**: *Aspergillus; Morchella;* **Basidiomycotina** : *Ustilago, Puccinia, Agaricus;* **Deuteromycotina**: *Alternaria.*

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Paper II - Diversity of Algae, Lichens, and Bryophytes M.M. 50

Unit-I

General characters. Range of thallus organization, classification, ultrastructure of eukaryotic algal cell and cyanobacterial cell, economic importance of algae. Lichens, classification, thallus organization, reproduction, physiology and role in environmental pollution.

Unit-II

Characteristics and life cycles of the following:-

Cyanophyta *Microcystis, Oscillatoria* :**Chlorophyta** *Chlamydomonas Volvox, Hydrodictyon, Oedogonium, Coleochaete, Chara;* **Bacillariophyta** *Navicula;* **Xanthopyta** *Vaucheria;* **Phaeophyta**; *Ectocarpus, Sargassum*

Rhodophyta *Polysiphonia*

Unit – III

Bryophytes, general characters, classification, reproduction and affinities. Gametophytic and soporophytic organization of:

Bryopsida: *Sphagnum;* **Anthocerotopsida:** *Anthoceros*

Unit - IV

Gametophytic and sporophytic organization of ***Hepaticopsida*** : Riccia, *Marchantia.*

Paper III – Diversity of Pteridophytes, Gymnosperms and elementary Palaeobotany M.M. 50

Unit - I

Pteridophytes: General features, classification, stellar system and its evolution. Comparative study of morphology, anatomy, development, vegetative and reproductive systems of following:

Lycopsida - *Lycopodium, Selaginella;**Psilopsida-*** *Rhynia*

Unit – II

General and comparative account of gametophytic and sprophytic system in

Filicopsida -*Pteridium, Marsilea.*

Heterospory and seed habit.

Unit - III

Gymnosperms: General characters, classification. Comparative study of morphology, anatomy, development of vegetative and reproductive parts in:

Cycadales: *Cycas,* **Coniferales:** *Pinus*

Unit –IV

Study of morphology, anatomy, development and reproductive parts in:

Coniferales – *Pinus* ; **Gnetales -** *Ephedra*

Affinities and relationship of Gymnosperms, evolutionary significance.

Elementary Palaeobotany: general account, types of fossils, methods of fossilization and geological time scale.

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B.Sc. II year

Paper I:	Diversity of Angiosperms: Systematics, Development & Reproduction	M.M. 50
Paper II:	Cytology, Genetics, Evolution & Plant Breeding	M.M. 50
Paper III:	Plant Physiology and Biochemistry	M.M. 50

(There will be 9 questions in each paper and candidate has to attempt only 5 questions. Q.1 will be compulsory based on units I - IV. Two questions will be set from each unit of which one question has to be attempted. All questions will carry equal marks)

Practicals: Based on papers I-III M.M. 50

Paper - I: Diversity of Angiosperms: Systematics, Development & Reproduction M.M. 50

Unit - 1

Systematics

Principles of classification, nomenclature; comparative study of different classification systems, viz. Bentham & Hooker, Engler & Prantl, Hutchinson, and Cronquist. Herbarium techniques and important Botanic Gardens.

Unit – II

Taxonomic study of following families and their economic importance:

Dicots; Ranunculaceae, Malvaceae, Brassicaceae, Cucurbitaceac, Rosaceae, Fabaceae, Rutaceae, Apiaceae, Apocynaceae,Solanaceae, Convolvulaceae, Acanthaceae, Lamiaceae, Asteraceae, Rubiaceae and Euphorbiaceae, Monocots: Poaceae, Liliaceae.

Unit - III

External morphology of vegetative and floral parts; modifications – phyllodes, cladodes, and phylloclades. Meristems-kinds study of tissue system - epidermal, ground, and vascular (SAM) and (RAM).

Anatomy of roots, stems, and leaves. Cambium - its function and anomalies in roots and stems.

Unit – IV

Structure and development of male and female gametophytes – microsporogenesis microgametogenesis, megasporogenesis, and megagametogenesis, embryo sac types. Double fertilization development of embryo, endosperm development and its morphological nature, apomixis and polyembryony.

Paper II: Cytology, Genetics, Evolution & Plant Breeding M.M. 50

Unit - I

Cell structure, cell organelles, nucleus, chromosome structure, nucleosome and solenoid model, salivary gland, lampbrush and B chromosomes.

Cell division – mitosis, meiosis; and their significance, chromosome: structural aberrations

Unit- II

Genetics, laws of inheritance; gene interaction; linkage cytoplasmic inheritance and sex determination.

Unit-III

Mutation- spontaneous, induced, molecular mechanism and evolutionary significance; polyploidy- origin, kinds and role in evolution.

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Unit - IV

Evidences and theories of evolution, Methods in Plant Breeding.

Paper III - Plant Physiology and Biochemistry. M.M. 5O

Unit - I

Plant and water relationship, properties of water. Water uptake, conduction, transpiration, mechanism and its regulation by environmental variables Guttation.

Mineral nutrition : Macro, and micronutrients, their role, deficiency and toxicity symptoms, mechanism of ion uptake and translocation.

Unit - II

Photosynthesis and Chemosynthesis : photosynthetic pigments, O_2 evolution, photophosphorylation, CO_2 fixation - C_3- C_4 and CAM plants, Photo rerspiration

Respiration : aerobic and anaerobic respiration, respiratory pathways glycolysis, krebs 'cycle, electron transport, oxidative phosphorylation, pentose phosphate pathway, photorespiration, cyanide resistant respiration.

Lipid biosynthesis and its oxidation.

Unit - III

Nitrogen metabolism : Biological nitrogen fixation, nitrogen cycle, nitrogen assimilation,

Growth: general aspects of phytohormones, auxins. Cytokinin, gibberellins, and ethylene: action and their application; photoperiodisin and vernalization. Seed germination, Plant movements, parthenocarpy, abscission and senescence.

Unit - IV

Biomolecules : Classification, properties and biological role of carbohydrates, Protein and lipids. nucleic acids.

Discovery and nomenclature. Characteristics of enzymes, concepts of holoenzyme, apoenzyme, coenzyme and cofactors and Mechanism of action.

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B.Sc. III year

Paper I:	Plant resource utilisation, Palynology and Biostatistics	M.M. 75
Paper II:	Molecular biology & biotechnology	M.M. 75
Paper III:	Environmental Botany and Plant Pathology	M.M. 75

(There will be 9 questions in each paper and candidate has to attempt only 5 questions. Q.1 will be compulsory based on Units I - IV. Two questions will be set from each unit of which one question has to be attempted. All questions will carry equal marks)

Practicals: Based on papers I-III M.M. 75

Paper I Plant Resource utilization, Palynology and Biostatistics 75 marks

Unit I

Centres of diversity and origin of crop plants. Domestication and uses of - wheat, rice, legumes, sugarcane and potato.

Unit II

A general account of following plants and their uses: Murstard, Ground nut, Coriander, Turmeric, Cotton, Jute, Tea, Rauwolfia, Neem, Jatropha and Teak.

Unit III

Conservation of plants.

In situ conservation santuaries, national parks, biosphere reserves, wetlands, ,mangroves.

Exsitu conservation; botanical gardens, field gene banks, seed banks, cryobanks.

Unit IV

An introductory knowledge to palynology, morphology, viability and germination of pollens.

Classification of data, mean, median and mode. Standard deviation, standard error, variance, co-relation, X^2 test

Paper II: Molecular biology and biotechnology M.M. 75

Unit – I

Nucleic acid as genetic material, nucleotides, structure of nucleic acids, properties of genetic code, Mechanism of Protein synthesis.

Unit - II

Enzymes: active sites, specificity, mechanisms, factors, general aspects of enzyme kinetics. Bioenergetics: Laws of thermodynamics.

Unit - III

Different types of RNA's, and their transcription replication of DNA in prokaryotes and enkaryotes.

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Unit- IV

Introduction to biotechnology, recombinant DNA technology, plant tissue culture, methods of gene transfer, transgenic plants, biotechnology and healthcare, microbial and environmental biotechnology.

Paper III- Environmental botany and plant pathology M.M. 75

Unit - I

Ecology: Enviromental factors, Ecological adaptations, Plant Succession, Ecosystem (Structure and functions).

Unit - II

Environmental pollution : air, water, soil, radioactive, thermal and noise pollutions, their sources, effects and control. (greenhouse effect, ozone depletion and acid rain). CO_2 enrichment and climate change.

Unit - III

Biodiversity and Phytogeography : biotic communities and populations, their characteristics and population dynamics. Natural vegetation of India, static and dynamic plant geography, basic principles governing geographical distribution of plants, endemism.

Unit - IV

Etiology of viral, bacterial and fungal diseases: mosaic diseases on tobacco, yellow vein mosaic of bhindi; citrus canker, little leaf of brinjal; damping off of seedlings late blight of potato, red rot of sugarcane, white rust of crucifers, Wheat rust and linseed rust.

Integrated pest disease management

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B.Sc. - FIRST YEAR

CHEMISTRY

There shall be three written papers and a practical examination as follows:

		Max. Marks
Paper – I	Inorganic Chemistry	33
Paper – II	Organic Chemistry	33
Paper – III	Physical Chemistry	34
	TOTAL	**100**
	PRACTICAL	50
	GRAND TOTAL	**150**

Candidate will be required to pass in Theory and Practical Separately.

B.Sc. - SECOND YEAR

CHEMISTRY

There shall be three written papers and a practical examination as follows :

		Max. Marks
Paper – I	Inorganic Chemistry	33
Paper – II	Organic Chemistry	33
Paper – III	Physical Chemistry	34
	TOTAL	**100**
	PRACTICAL	50
	GRAND TOTAL	**150**

Candidate will be required to pass in Theory and Practical Separately.

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B.Sc. - THIRD YEAR

CHEMISTRY

There shall be three written papers and a practical examination as follows:

		Max. Marks
Paper – I	Inorganic Chemistry	50
Paper – II	Organic Chemistry	50
Paper – III	Physical Chemistry	50
	TOTAL	**150**
	PRACTICAL	75
	GRAND TOTAL	**225**

Candidate will be required to pass in Theory and Practical Separately.

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CSJM UNIVERSITY KANPUR
Syllabus of Zoology
(B.Sc. I, II, & III year)
B.Sc. - First Year
Practical

1- Dissection (Major)	12 Marks
2- Dissection (Minor)	05 Marks
3- One Temporary Mount	03 Marks
4- One Permanent Mount	05 Marks
5- Cytology & Genetics Preparation/Prepared slides	05 Marks
5- Identify and Comment upon spots (1-10)	10 Marks
6- Viva-Voce	05 Marks
7- Practical class record	05 Marks
	Total **50Marks**

CSJM UNIVERSITY KANPUR
Syllabus of Zoology
(B.Sc. I, II, & III year)
B.Sc. -Second Year2
Practical

1. Dissection(Major)	10 Marks
2. PermanentMount	05 Marks
3. Commentupon Physiology Apparatus	05 Marks
4. (i) Suitable preparation of Hemin crystals from the blood (ii). Detect the Sugar /albumin / acetone from urine sample	05 Marks
5. StainedPreparation of (i) Striped or Unstriped muscles (ii) Cartilage (hand cut Section) (iii) Blood film/Aereolar tissue	05 Marks
6.Identifyand Comment upon spots (1-10)	10 Marks
7. *Viva-Voce*test	05 Marks
8. Practicalclass record	05 Marks
	Total **50Marks**

C.S.J.M. UNIVERSITY, KANPUR

B.Com – I (Session 2018-19 onwards)				
GROUP	**PAPER**	**NAME OF PAPERS**	**MAX MARKS**	**MIN MARKS**
GROUP – A	PAPER – I	Information Technology and Business Communication	100	66
	PAPER – II	Business Statistics	100	
GROUP – B	PAPER – III	Financial Accounting	100	66
	PAPER – IV	Business Regulatory Framework	100	
GROUP – C	PAPER – V	Business Economics	100	66
	PAPER – VI	Business Environment	100	
		Total Marks	**600**	**198**
B.Com – II (Session 2019-20 onwards)				
GROUP – A	PAPER – I	Company Law	100	66
	PAPER – II	Cost and Management Accounting	100	
GROUP – B	PAPER – III	Income Tax	100	66
	PAPER – IV	Goods and Services Tax	100	
GROUP – C	PAPER – V	Public Finance	100	66
	PAPER – VI	Industrial Laws	100	
		Total Marks	**600**	**198**
B.Com – III (Session 2020-21 onwards)				
GROUP – A Compulsory	PAPER – I	Corporate Accounting	100	66
	PAPER – II	Auditing	100	
GROUP – B Compulsory	PAPER – III	Project Planning and Control	100	66
	PAPER – IV	Principles of Business Management	100	
GROUP – C Optional	PAPER – V	Financial Management	100	66
	PAPER – VI	Financial Services	100	
Or				
	PAPER – V	Marketing Management	100	66
	PAPER – VI	International Marketing	100	
		Total Marks	**600**	**198**

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BACHELOR OF LIBRARY & INFORMATION SCIENCE

(B. Lib. I. Sc.)

One Year Degree Course **COURSE CONTENTS**

Internal Exten.

Paper No.	Paper Title	Sessional marks	Exam marks	Total
I	Foundations of Library & Information Science	20	80 T	100
II	Management of Libraries & Information Centers/Institutions	20	80 T	100
III	Knowledge Organization and Information Retrieval (Theory)	20	80 T	100
IV	Knowledge Organization Practice I	20	80 T	100
V	Knowledge Organization Practice II	20	80 T	100
VI	Information Sources	20	80 T	100
VII	Information Users, Systems and Services	20	80 T	100
VIII	Library & Information Technology : Theory	20	80 T	100
Practical	Library and Information Technology : Practice	20 P	80 P	100
	Grand Total	180	**720**	**900**

Ext. Prac

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REGULATIONS FOR THE TWO YEAR DEGREE OF

BACHELOR OF EDUCATION (B.Ed.)

- The B.Ed. program shall be of duration of two academic years, which can be completed in a maximum of three years.
- The minimum attendance of student teacher shall have to be 80% for all course work and practicum, 90% for school internship.
- The course structure of B.Ed. two year program is designed with three broad curricular areas as perspectives (core),curriculum and pedagogic studies(teaching methods), practicum (engagement with the field)

Year 1	Category	Paper No.	Title of Papers	Marks	
				External	Internal
	(a) Perspectives	I	Philosophical Perspectives of Education	80	20
		II	Sociological Perspectives of Education	80	20
		III	Psychological Perspectives of Education	80	20
	(b) Curriculum & Pedagogic Studies	IV & V	Subject Knowledge and Related pedagogic dimensions (Subject : Science – Biology /Physical /Mathematics/ Social Science / Language – Hindi/ English/Urdu/Sanskrit /Arts/Home Science/Music/Commerce ***Note-Two languages cannot be opted simultaneously***	80	20
				80	20
	(c) Practicum	VI	Language Proficiency in English	Through grades Min D required to pass A- Excellent B- Very good C- Good D- Satisfactory E- Unsatisfactory	
		VII	Health , Physical and Yoga Education		
		VIII	Information and Communication Technology		
		IX(a)	Observation (one week before internship)		10
		IX(b)	Internship and Practice of teaching (1 Month)		20+20
		IX(c)	Comprehensive Viva	50	
			Total	**450**	**150**
			Grand Total	**600**	
Year 2	a)Perspectives	I	Development of Education System in India and its Challenges	80	20
		II	Curriculum Development and Assessment	80	20
		III	Educational Leadership and Management	80	20
		IV	Educational Guidance and Counseling	80	20

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	b)Practicum	V VI	Issues related with Environment Issues in Education (Gender, Social Inclusion Peace, Value Inculcation)	Through grades. (Minimum D required to pass) A- Excellent B- Very good C- Good D- Satisfactory E- Unsatisfactory	
		VII	Internship (16 Week) • Action Research • Cumulative Record of a child during Internship • Application of Achievement Test		50
		VIII	Comprehensive Viva	50	
		IX	Final Practice of Teaching (Each Method)	50+50	
Year 2			**Total**	**470**	**130**
			Grand Total	**600**	
Year 1			Total	**450**	**150**
			Grand Total	**600**	
			Grand Total (Year 1 + Year 2)	**1200**	

In the first year-

Category is Perspectives (core) comprises of three compulsory papers as-

I. Philosophical Perspectives of Education

II. Sociological Perspectives of Education

III. Psychological Perspectives of Education

The maximum marks for all the perspectives paper will be 100, out of which 80 marks will be external and 20 marks will be internal

Category B is Curriculum & Pedagogic Studies (teaching methods) wherein the student has to choose two teaching methods out of following School Subjects:
Biological Sciences/ Physical Sciences /Mathematics/ Social Science/ Hindi/ English/ Urdu/ Sanskrit / Arts/ Home Science/ Music/Commerce
Note- Two languages cannot be taken simultaneously.

- The maximum marks for Curriculum & Pedagogic studies will be 100, out of which 80 marks will be external and 20 marks will be internal (which includes 10 marks for micro teaching + 5 marks for attendance+5 marks for any activity as prescribed).

Category C is practicum which is compulsory, this category is sub-divided in to 3 papers (which consists of both theory and practice) - **Paper VI** *Language Proficiency in English* , **Paper VII** *Health, Physical and Yoga Education*, **Paper VIII** *Information and Communication Technology*. These papers will be evaluated by respective teachers through grades (A= EXCELLENT (80 and above), B = VERY GOOD (79.9-70), C= GOOD (69.9-60), D=SATISFACTORY (59.9- 50), E= UNSATISFACTORY (49.9-40). The question paper will be prepared by the university. The evaluated answer books along with the grading will be sent by the colleges to the university within a week after the end of the examination.

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M.A. (Home Science)
COURSE OUTLINE
From Session 2015-16
M.A. I

Paper	Title		Max Marks
I	Traditional textiles & Apparel Designing		100
II	Advance Nutrition and Institutional Management		100
III	Life span Development		100
IV	Research Methodology		100
Practical			
1-	Textiles & Apparel Designing	80	100
2-	Advanced Nutrition	20	

M.A. (Home Science)
COURSE OUTLINE
M.A. II

Paper	Title		Max Marks
I	Therapeutic Management & Community nutrition		100
II	Resource Management & Interior Designing		100
III	Early childhood care & Education/Dissertation		100
IV	Extension Education & Communication		100
Practical			
1-	Therapeutic Nutrition+ Project	(40+20) int. 60	100
2-	Resource Management & Interior Designing	15	
3-	Project – Extension Education & Communication	10	
4-	E.C.C.E – Teaching Aid/Case study	15	

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M.A. I
PAPER – I

Traditional Textiles and Apparel Designing

Objective

1- To impart knowledge about the traditional textiles of India
2- To enable the students to familarize with the essentials of apparel making
3- To acquaint with the various steps involved in the apparel making system and to gain skill in making certain garments.

Unit – I

Introduction to Traditional Indian textiles

1- Dacca Muslim
2- Chanderi Sarees and muslin
3- Kashmir shawls
4- Brocades of Hyderabad
5- Banaras Brocades
6- Brocades of Gujrat
7- Tie & Dye of Rajasthan and Gujrat
8- Patola of Gujrat, Orissa and Cuttack (Ikat)
9- Kota cotton and zari border sarees of Rajasthan

Unit – II

Embroideries of India

1- Chikan Kari of Uttar Pradesh
2- Kasuti of Karnataka
3- Phulkari of Punjab
4- Kashida of Kashmir
5- Kantha of Bengal
6- Embroidery of Kutch and Kathiawar
7- Zari Embroidery
8- Sindhi Embroidery
9- Chamba Rumal
10- Manipuri

Unit – III

Design Analysis with respect to apparel and textile design

1- Introduction to applied art
   - Elements of Design
   - Principles of Design
2- Designs : Structural, Decorative and abstract designs

Unit – IV

1- Introduction of Apparel Design with respect to Fashion
   - Fashion cycle
   - Theories of Fashion
   - Fashion terminology
2- Family clothing
   - Factor affecting family clothing
   - Wardrobe planning for the family

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Unit – V

1- Layout Planning
   - Calculation and Estimation of fabric for garment construction
   - Type of layout
2- Fittings – Principles, common fitting problems for different figure type, their rectifications
   - Short figures
   - Thin figures
   - Large & flat chest
   - Flat & large hips
   - Broad & narrow shoulders
   - Long, short & thick neck
3- Techniques in pattern making
   - Flat pattern
   - Drafting
   - Draping

Practical

Dress Designing & Clothing Construction

1- Make samples of Indian traditional embroideries.
2- Design Ideals for fashion
   - Color wheel
   - Value chart
   - Intensity chart
   - Grey scale
   - Elements of Art
   - Principles of Art
3- Construction techniques (Make their samples on ½ scale of 2 yrs Bodice Block)
   - Seams
   - Methods of fullness control
     - Gathers
     - Pleats
     - Darts
     - Tucks
   - Necklines
   - Plackets
4- Drafting & stitching of
   - Basic child Bodice block (Age : 2 yrs)
   - Adults Bodies Block (with Darts) – ((Standard and self)
   - Blouse
   - Suit
     - Shirt
     - Salwar
   - Nighty/Gown

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Sessional Work

1- Files – Drafting, designing, embroidery
2- Samples in Files
3- Garments :-
   a. Designer Blouse
   b. Party suit
   c. Nighty/Gown

Distribution of Marks	:	**M.M. 80**
1- Embroidery	-	10
2- Sessional	-	30
3- Drafting	-	10
Garments & cutting	-	25
Stitching & finishing		
Viva	-	05

Books & References

Paper I

Traditional Textiles & Apparel designing

1- Agarwal Rajni & Gupta Sanjula	-	Paridhan Nirman Avam Fashion Designing
2- Hanery Sapna & Patni Manju	-	Parivarik Paridhan Vyavastha
3- Patni Manju	-	Vastra Vigyan Avam Paridhan Vyavastha, Star Publication, Agra
4- Singh Vrinda	-	Vastra Vigyan Avam Paridhan
5- Tumter G.L.	-	Cutting & Tailoring.
6- Verma Pramila	-	Vastra Vigyan Avam Paridhan

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M.A. I
PAPER – II
Advanced Nutrition and Institutional Management

Objective
Advance Nutrition and Institutional Management

- To enable to understand about catering management for various organization
- To enable them to understand the basic attributes regarding foods
- To enable them to find out food costing in various institution
- To enhance the managerial skills required for institutional services.

Unit – I
Advance Nutrition

1- Nutrients - Sources, classification, function and deficiency diseases, RDA Calculation of nutritive value of meals for a college going girl & boy
2- Food Preparation - Methods & their effect on Nutrition values of foods & Prevention of nutrient losses during cooking
3- Food Fortification & Food Supplementation

Unit – II

1- Food Adulteration - Definition, common adulterants & Simple methods of Detection
2- Food Laws
3- Food Packaging & Labeling
4- Food Packaging materials

Unit – III

1- Sensory evaluation of food – Definition, methods & factors affecting Food acceptance
2- Leavening agents

Unit – IV

1- Concept & definition of catering services in various Institution
2- Type of services – cafeteria service, Hospital service, vendor, etc, self service

Unit - V

1- Type of menu – Cyclic, Al-a-carte, Table-d-hote etc
2- Serving meals for large groups & its management – Hostel, Canteen, Hospital, Railways & Air lines, Hotel

Practical

1- Calculation of one day's diet for adolescent boy & girl
2- Detection of common adulterants in the lab.
3- Report writing of visit to Hospital/ Hotel/ Hostel/ Canteen etc.
4- Running a food service unit.

Distribution of Marks M.M. 20

1- Calculations - 10
2- File work - 10

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Books & References

Paper II

Advance Nutrition & Institutional Management

1-	Bamji, Rao and Reddy	-	Text Book of Human Nutrition
2-	Davidson and Passmore	-	Human Nutrition & Dietetics
3-	M. Swaminathan	-	Essential of Food & Nutrition
4-	M. Swaminathan	-	Advanced Text book on Foods & Nutrition – Volume – I & II
5-	Mohini Sethi	-	Institutional Management
6-	Proudfit and Robinson	-	Normal and therapeutic nutrition
7-	R. Rajlaxmi	-	Applied Nutrition
8-	Misra Usha & Agarwal Alka	-	Aahaar Avum Poshan Vigyaan
9-	Gopalan, C	-	Nutritive value of Indian foods

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M.A. I
PAPER – III
Life Span Development (L.S.D.)

Objectives

- To become acquainted with development stage from birth to old age
- To develop awareness of Important aspect of development during the whole life span
- To understand the Issues faced and adjustment required at each stage across the life span

Unit – I

1- Concept of L.S.D. and need to study development through the life cycles
2- Principles of growth & development
3- Developmental tasks during different life stages
4- Nature vs Nurture controversy (Heredity & environment)

Unit – II

Prenatal Development & infancy (0-2 yrs)

1- How life begins
2- Stages of Prenatal Development, Factors affecting Prenatal period
3- Birth Process
4- Complications related to birth process & genetic defect among children
5- New born features & capabilities
6- Physical & Motor Development
7- Early Interactions
8- Prespeech Forms

Unit – III

(a) Early childhood (2-6yrs)

1- Physical & motor development
2- Play & Social relationship
3- Language & Emotional development
4- Cognitive development – theory of Jean Piaget

(b) Late childhood (7-12yrs)

1- Changes in physical & Motor development
2- Moral development – Kohlberg's theory of moral development
3- Social relationship : Peers, siblings & Parents
4- Cognitive Development – Theory of Jean Piaget

Unit – IV

Adolescence (12-18yrs)

1- Physiological changes
2- Primary & secondary sex characteristic, early & late maturing adolescents
3- Identity Formations
4- Social & emotional development.
5- Problems of adolescence – Drugs, alcohol, delinquency, homo sexual relation, Academic failure, Psychological problems: causes & remedies.

Unit – V

Adult hood and old age

1- Young Adulthood – (19-35yrs.)
   - Significance of the period, Responsibilities & adjustment
2- Middle Adulthood (35-50yrs.) salient features
   - Physical changes, health issues and changing roles in the family

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3- Late Adulthood – (50-60yrs.)

- Changes in personality, social relationship
- Occupational changes, health & disease

4- Old age – (60 & above)

- Physical changes & Psychological influence of ageing

Books & References

Paper III

Life Span Development

1- Agarwal Neeta & Tripathi Akansha - Manav Vikas

2- Berk Laura E (1996) - Child Development, New Delhi, Prentice Hall

3- Santrok John W - Samtrok Jhon W (1997) Life Span Development

4- Lal J.N. , Shrivastava Anita - Adhunik Vikasatmak Manovigyan, Vinod Pustak Mandir, Agra

5- Papalia D.E. (1997) - Human Development, Tata Mcgraw Hill Pub. Co.

6- Rice F.P. - Human Development, A Life Spam Approach, N.J. prentice Hall- 1965

7- Singh Vrinda - Manav Vikas & Avam Parivarik Sambandh

8- Shrivastava D.N. & Verma Preeti - Bal Manovigyan & Bal Vikas

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M.A. I
PAPER – IV
Research Methodology

Objectives

- To understand the significance of Research methodology in Home Science
- To understand the types, tools & methods of Research
- To develop the ability to construct data gathering instruments of the research design

Unit – I

1- Definition & Meaning of Research, its nature & scope
2- Characteristics of Scientific research
3- Steps in Research
4- Importance of research
5- Recent trends in Research in Home science
6- **Research Problem**
   a- Definition & importance of Research problem
   b- Sources of problem
   c- Statement of problem
   d- Types of problems
7- **Hypothesis**
   a- Definition & importance of hypothesis
   b- Statement of hypothesis
   c- Types of hypothesis

Unit – II

1- **Variables**
   - Definition & Classification of variables
2- **Sample & sampling technique**
   a- What is a sample
   b- Essentials of a good sample
   c- Sampling methods
   d- Advantages & limitation of sampling
3- **Basic principles of Research designs** – Single group Factorial design etc.

Unit – III

Research methods & Procedures/Types of research

1- Historical Research
2- Descriptive Research
3- Experimental Research
4- Ex Post Facto Research
5- Methodological Research
6- Action Research
7- Survey Research
8- Field Research

Their meaning, characteristics, Advantages & Disadvantages.

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Unit – IV

(A) Reliability & Validity

1- Definition & meaning
2- Different types – in brief

(B) Data collection tools & techniques

1- Observation
2- Interviews
3- Questionnaire & schedule
4- Socio metric techniques
5- Rating Scales in brief
6- Psychological test- their meaning, characteristics & types

Unit – V

Treatment & Interpretation of Research Data

A- Classification & tabulation of data
1- Different types of graphs
2- Measurement of central tendency – Mean, Median & Mode

B- Presentation of Research Report – Result and conclusion & Bibliography

Books & References

Paper IV

Research Methodology

1- AshtanaVipin, Srivastava Vijay & Asthana Nidhi - Educational Research And Statistics
2- Elhens D.N. - Fundamentals & Statistics
3- Goode & Halt - Methods of Social Research
4- Kapil H.K. - Research Methods in Behavioral Sciences
5- Karlinger F.N. - Foundation of Behavioral Research
6- Paras Nath Rai - Anusandhaan Parichay
7- Sareen & Sareen - Educational Research Methods
8- Shrivastava D.N. - Anusandhaan Vidhia

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M.A. II

PAPER – I

Therapeutic Management & Community Nutrition

Objectives

This course will enable the student to

- Know the principle of diet therapy
- Understand the modification of normal diet for therapeutic purposes
- Be able to make appropriate dietary modifications for various disease conditions
- To have elementary knowledge of community nutrition

Unit – I

Therapeutic meal management

1- Recommended dietary allowances. Meaning and basis for the I.C.M.R. allowances
2- Meal Planning: Principles involved in planning menus. Menus modification to suit different age groups and special condition.
3- Adaptation of normal diet for therapeutic purpose: Light, soft, full fluid and clear fluid diet, bland diet applications

Unit – II

Planning following therapeutic diets

1- Nutritional anaemia
2- Diet in fever, acute and prolonged typhoid
3- Diet for overweight
4- Diet in kidney diseases, acute & chronic nephrites
5- Diet in relation to endocrine disorders, diabetes millets, Hyperthyroidism

Unit – III

1- Diet in relation to diseases of the gastrointestinal traits, Diarrhea, constipation and duodenal ulcer etc.
2- Liver diseases – Liver cirrhosis, Jaundice, Convalescent and post operation diets
3- Diet in cancer

Unit – IV

Community Nutrition

1- Assessment of the nutritional status of community
   - Clinical examination
   - The study of vital statistics (in brief)
   - The study of anthropometric data
   - Dietary surveys

Unit – V

1- Method and aids for imparting nutrition education

Practicals **M.M. – 60**

1- **Preparation of the following diet**
   - Soft & low fiber diet
   - Law calorie diet
   - High calorie diet
   - Diabetic diet – food exchange list
   - High protein diet
   - Low fat diet
   - Sodium restricted diet
2- **Sessional work**
   - Practical note book
   - Recipe file
   - Project work

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Distribution of Marks

- Planning & calculation of various nutrients - 10 marks
- Cooking & serving of the therapeutic diet - 20 marks
- Viva - 10 marks
- Seasonal - 20 marks

Books & References

Paper I

Therapeutic Management & Community Nutrition

1- Anita - Clinical Dietetics and Nutrition
2- Barber cooper Mitchell - Nutrition and health disease
3- Bakshi B.K. - Pathyapathay Avum Upchararth Poshan
4- Davidson & Passmore - Human Nutrition and Dietetics
5- Jellife - Clinical Nutrition
6- Proudfitl & Robinson - Nutrition and diet therapy

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M.A. II
PAPER – II
Resource Management & Interior Designing

Objectives

- To create an awareness about management in the family as well as the other system
- To recognize the importance of wise use of resources in order to achieve goals
- To know the consumer legislation and their limitations

Unit – I
Management

(a) Meaning & basic concept of Home Management/Resource Management
(b) Process of management – Planning, Organizing, Controlling & Evaluation
(c) Decision making – Meaning & concepts, methods of resolving conflicts
(d) Resources – Classification, factors affecting their use
(e) Family life cycle – Stages , Demands upon resources time, energy & money

Unit – II
Management of Resources

(a) Ergonomics – Importance & applications
(b) Energy & time management
(c) Money management – Income, Expenditure, Budget, Saving & Investment
(d) Work Simplification – Concept & techniques, Mundel's classes of change

Unit – III
Consumer behavior & Problems

(a) Problems faced by Indian consumers
(b) Sources of consumer information
(c) Government Program for consumer Protection – Standardization, Quality control, Fixation of prices
(d) Major consumer laws

Unit – IV
Housing

(a) Factors affecting house planning
(b) House plans for different income groups
(c) Kitchen plans – Types of kitchen & Areas of kitchen
(d) Financing agencies – L.I.C., Banks, Housing boards & Co-operative Societies
(e) Basic building material used in construction of a House

Unit – V
Interior Design

(a) Application of Elements & Principles of design
(b) Colors – Importance, classification (Prang), Dimensions, Colors schemes
(c) Basics of furniture Design and type of furniture design, current trends in interior design

Practical **- 15 marks**
File work **- 10 marks**

1- Application of Principles & Elements of design
2- Color schemes
3- House plans for different income group
4- Different types of kitchen plans

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Final Practical

One House/Kitchen plan - 5 marks

Books & References

PAPER – II

Resource Management & Interior Designing

1- Bakshi B.K. - Grah Prabandh

2- Dacon R.E. and Firabaugh F.M. - Family Resource Management Principle & Application, Allyn & Bacon Ins London 1988

3- Deshpande R.S. - (1974) Modern ideal Homes of India, United Book Corporation

4- Etienne Grandjean - Ergonomics of the home, Taylor & Francis Ltd., London

5- Gross I.H. & Crendall E.W. Knoll M.M. - Management for Modern families, Prentice Hall Inc., New Jersey 1980

6- Nickell and Dorsey - Management in family living

7- Patani Manju - Grah Prabandh

8- Patni Manju & Sharma Lalita - Grah Prabandh

9- Singh Vrinda - Grah Prabandh & Antrtik Sajja

10- Wadhwa T. - Indian Home plans, Kohinoor Pub., Agra 1990

M.A. II
PAPER – III (A)
Early Childhood Care & Education

Objectives

- To enable the students understand different types of education
- To make them aware of basic set up of &requirements of a pre school
- To understand basic needs of children wire special needs.
- To enable them to prepare teaching materials for different aspects of development

Unit – I

1- Importance, need & scope of ECCE
2- Objective of ECCE
3- Gen. Contribution of following thinkers to the Development of ECCE
   (a) Frobel
   (b) Maria Montessori
   (c) M.K. Gandhi
   (d) Rabindra Nath Tagore

Unit - II

1- Type of Preschool Programs : Play centers, Kindergartner, Day care centers, Balwadi Anganwadi, Crèche, Balbhawan
2- Concepts of formal, non-formal & play way methods
3- Methods of child study & Assessment

Unit – III

Organizational set up of ECCE

1- Basic infrastructure building, indoor & outdoor space
2- Equipment & material required to set up a preschool
3- Administrative set up & personnel working at different levels
4- Essential qualities of a preschool teacher
5- Activities & related material for :
   (a) Language development
   (b) Mathematical concepts
   (c) Art & Motor creative abilites
   (d) Science concepts
   (e) Physical & Motor activities

Unit – IV

Children with special needs

1- Definition & classification of children with special needs
2- Needs & techniques for early detection, screening & assessment, guidance & counseling
3- Classification, Characteristics, Causes, Care, Education & Vocational training & counseling of the following –
   (a) Physically handicapped
   (b) Slow learners & mentally retarded
   (c) Children with behavioural problems

Unit – V

(a) **Gifted children** – Identification, classification & guidance Special educational measures
(b) **Children at risk** - Street children, Child labor, Child abuse, Delinquent children, Orphans– Identification, causes, education & rehabilitation measures, guidance & counseling

Practical **Sessional 15 Marks**

1- Prepare teaching learning material for pre-school children
2- Case study of a child with special needs/Project

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M.A. II
PAPER – III (B)

Dissertation (Theory) **M.M. - 100**

Note – Dissertation will be allowed to candidates with minimum 55% marks in Previous Examination

M.A. II
PAPER – III
Early Childhood Care & Education
Books & References

1- Agarwal J.C. - Nursery School Sangthan Samudaya Bal Swasthya and Poshan, Doaaba House Pub.

2- Agarwal J.C. - Purva Prathmic Shiksha ka Itihas & Darshan, Doaaba House Pub.

3- Grewal, J.S. 1998 - Early Childhood Education, Foundation & Practices, Harprasad Bhargava Educational Publishers, Agar

4- Jain Sashsi Prabha - Balyavastha Dekhbhal Aur Siksha, Shiva Publication, Indore

5- Kaul Venita - Early Childhood Education Programme, NCERT Publication

6- Kudesia, Umeshchand - Shiksha Prashasan

7- Soni Romila - Early Childhood care & Education

8- N. Murlidharan - The System of Preschool Education in India, Indian Association for preschool Education, 1982

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M.A. II
PAPER – IV
Extension Education and Communication

Objectives

- To Understand the process of communication in development work
- To be sensitive to the interests & need of the people and the power of the media and method in catering to these needs & interests
- TO enhance self employment, potential through entrepreneurial skill training

To be aware of the agencies working for the welfare of women & children

Unit – I

Extension Education

(a) Concept, need & Aims of extension education
(b) Principles of extension education
(c) Non formal, formal & Extension Education
(d) Home Science Extension Education – Meaning, Characteristics, History & Development program

Unit – II

Communication

(a) Definition, concept, elements and classification of communication
(b) Traditional & modern methods and materials of communication
(c) Communication model
(d) Barriers of communication and measures for effective communication
(e) Feedback in communication

Unit – III

Policies and programs for Women Development

(a) Concept of gender & changing trends
(b) Women & development Approaches
(c) Welfare Programmes for women & children
DWCRA, TRYCSEM, ICDS, SHG, CARE, CHETNA, SEWA
(d) National and International Institutions working for welfare of women & children
C.S.W.B., I.C.A.R., I.C.M.R., WHO, UNICEF, NIPCCD

Unit – IV

Community Development Programme

(a) Meaning, Principles, aims of Community Development
(b) Method of Community Development
(c) Achievement of community Development Programme

Unit –V

Entrepreneurship

(a) Definition meaning, importance & scope of entrepreneurship
(b) Functions & types of entrepreneurship
(c) Process of Entrepreneurship
(d) Sources of finance/funding, financial and development institution, assisting small enter premiership ventures

Seasonal work **Project** **10 Marks**

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PAPER – IV

Extension Education and Communication

Books & References

1- Daham O.P. & Bhatnagar O.P. - Education & Communication for Development, Oxford Pub. Company, New Delhi

2- Harpalani - Prasar Shiksha

3- Joshi Uma - Understanding Development Communication, Domincent Publisher, New Delhi – 2001

4- Kuppuswami B. - Communication & Social Development in India, Media Promoters & Publishes Pvt. Ltd., Mumbai

5- Patel V. - Women Entrepreneurship, Developing New Entrepreneurship, Ahemdabad-1987

6- Shah Pushp Geeta, Shasheela Jayas - Prasar Shiksha

7- Singh Vrinda - Prasar Shiksha

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C.S.J.M.UNIVERSITY , KANPUR
MASTER OF LIBRARY AND INFORMATION SCIENCE
(M.Lib.I.Sc.)
One Year Post Graduate Course
COURSE CONTENTS

Paper No.	Paper Title	Sessional Marks	Exam Marks	Total
I	Knowledge, Information and Communication	20	80	100
II	Information Storage and Retrieval (Theory)	20	80	100
III	Knowledge Organisation – Practice I (Depth Classification)	20	80	100
IV	Information Processing & Retrieval– Practice II (Advance Cataloguing)	20	80	100
V	Marketing of Information Products and Services	20	80	100
VI	Information Systems and Organisations	20	80	100
VII	Research Methodology and Statistical Techniques	20	80	100
VIII	Information Technology Applications: Theory	20	80	100
IX	Information Technology Applications: Practical	20	80	100

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PAPER –I

KNOWLEDGE, INFORMATION AND COMMUNICATION

UNIT –I

- Information : Nature, Properties, Types and Scope
- Conceptual difference between Data, Information and Knowledge
- Information Generation: Modes and forms
- Information Theory, Information Diffusion Process
- Intellectual Property Rights Act

UNIT –II

- Knowledge Management: Definition, concept , need, types& models
- Components and process of Knowledge Management
- Types of Knowledge
- Information Management Vs Knowledge Management

UNIT –III

- Communication :Genesis and Characteristics
- Communication Process, Types and Media
- Communication Channels and Models
- Communication of Information and Barriers to I.C.
- Trends in Scientific Communication

UNIT –IV

- Information Society: Concept & Definition
- Socio-economic implication of information
- Changing role of Library and Information Centres in Modern Information Society
- Information Industry: An overview

UNIT –V

- Information Policies: National Programmes and Policies
- National Information Policy (NIP)
- National Policy on Library and Information System (NAPLIS)
- National Knowledge Commission (NKC)
- National Mission on Libraries(NML)

Recommended Books:

1. Khan, M.T.M. (1998). Information organization and communication. New Delhi: EssEss Publications.

2. Parashar, R.G. (2003). Information and its communication. New Delhi: Medallion Press.

3. Rikowski,R.(2007). Knowledge Management: Social, cultural and theoretical perspective. U.K.: Chandos Publishing.

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4. Sharma,S. &Gopal S.(2011). Applications of Knowledge Management in digital era. New Delhi: GNOSIS.

PAPER –II

INFORMATION STORAGE AND RETRIEVAL (THEORY)

UNIT –I

- IRS: Concept & Definitions
- Objectives, operations and design of information retrieval systems(IRS)
- Compatibility of information retrieval system
- IRS evaluation

UNIT –II

- Information retrieval tools: classification cataloguing, indexing, abstracting and online retrieval, Universal Bibliographical Control
- Standardization activities of bibliographic description, ISBD, MARC I, MARC II , UNIMARC, CCF,MARC21, DublinCore

UNIT –III

- History and development of subject indexing,
- Pre-coordinate indexing, Post-coordinate indexing
- Special type of indexing – citation indexing , Key word indexing
- Indexing languages: Thesaurus, Vocabulary control,
- Evaluation of indexing system

UNIT –IV

- Abstract and Abstracting: Concept & Definitions
- Uses and Techniques of abstracting
- Abstracting services in different disciplines: LISA, ISA, CA, BA
- Indexes in abstracting services: IndexMedicus etc.

UNIT –V

- Search Process; Search strategies
- Multiple information retrieval process
- Database searching, Internet searching, Meta searching, Data Harvesting

Recommended Books:

1.Chowdhury, G.G. (2010). Introduction to model information retrieval system (3rd ed.). London: Facet Publishing.

2.Lancaster, F.W. (2003). Indexing and abstracting in theory and practice. Urabana: University of Illions.

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लहेरियापुरा भोतास विकास खण्ड

3. Rajan, T.M. (1981). Indexing Systems: concepts, models and techniques. Calcutta: IASLIC.

4. Salton G. & McGill, M.J. (1983). Introduction to modern information retrieval. New York: McGraw-Hill.

PAPER III

KNOWLEDGE ORGANISATION PRACTICE-1(DepthClassification)

- Classification By UDC(Abridged Rev .English Ed.1961
- Introduction of scheme: History, Structure, Principles
- Introduction to common Auxiliaries and Special Auxiliaries
- Adequate Number of titles From All Disciplines
- Use of common and special Auxiliaries

Candidates will be required to Classify 20 titles in all

PAPER IV

INFORMATION PROCESSING & RETRIEVAL PRACTICE-2(Advance Cataloguing)

Use of AACR-2 (R) (2002)

- Cataloguing of Multi Volume Books
- Cataloguing of Composite Books
  - With collective Title (Ordinary Composite books)
  - Without Collective Title (Artificial Composite books)

- Cataloguing of documents related to corporate authorship
  - Government Publications
  - Institution publications
  - Conference /congress/seminar /Workshop Publications

- Cataloguing of serial/ journal Publication
- Cataloguing of Non –Book Materials
  - Cartographic Materials
  - Manuscripts
  - Sound Recordings
  - Motion Pictures And Videorecordings
  - Microforms

Library of Congress List of Subject Headings will be followed.

Candidates will be required to catalogue 5 Titles in all.

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PAPER-V

MARKETING OF INFORMATION PRODUCTS AND SERVICES

UNIT-1

- Marketing: Concept,Definitions, Need, Functions
- Information Products: Concept, Nature, Definitions, Design and Types
- Information Analysis and Consolidation
- Packaging and Repackaging of Information

UNIT-2

- Distribution Channels
- Marketing Mix
- Marketing Strategy:SWOT Analysis, PERT/CPM
- Techniques and Tools of Market Analysis
- Content Analysis: Techniques , Methods and Purpose

UNIT-3

- Information as a Marketable Commodity
- Demand and Supply of Various Information Services
- Factors affecting Demand and Supply
- Distribution and Marketing of Information

UNIT-4

- Information Analysis Centres (IAC)
- Information Centres: Types & their organisation
- Referral Centres: Need & functions
- Data Centres: Concept, Definitions, typesand functions
- Planning and Organisation of Information Analysis and Consolidation Centres

UNIT-5

- E-Marketing: Concept, strategies, Use, Advantages
- Information Audit: Role, Scope, Methodology
- Market Segmentation.
- Trends in Information Analysis
- Electronic Content Creation

Recommended Books:

1. Gupta, D. K., et al.(2006). Marketing Library and Information service: International perspectives. Munich: K. G. Saur.

2. Kotter, Philip.(2002). Marketing Management. Delhi: Prentice Hall.

3. Chopra, H.S.(1996). Information marketing. Jaipur: Rawat Pub.

4. Jain, AbhinandanK,et.al.(1999). Marketing information products and services: A primer for libraries and information professionals. New Delhi: Tata Mcgraw Hill.

PAPER –VI

INFORMATION SYSTEMS & ORGANISATIONS

Unit-1

- Information Systems: Concept, Definition, Characteristics, Objectives, Types and constraints
- Data Banks, Clearing Houses
- National Information System: Concept, Components, Objectives, Requirements, Planning and Designing

Unit-2

- National and International Organizations and Programs: Functions, Features and Services
- CSIR, ICSSR, DRDO, DST, UGC, ICAR, ICMR
- UNESCO, IDRC
- IAEA, ILO

Unit 3

- National and International Information Systems: Functions and Features
- NASSDOC, NISCAIR, DESIDOC
- SENDOC, ENVIS, NIC
- AGRIS, INIS, MEDLARS

Unit-4

Professional Organizations Promoting Information System

- ILA, ALA,SLA
- IASLIC, IFLA
- IATLIS, ASLIB, CILIP

Unit-5

- Organisation promoting Information Systems
- UNESCO, UNIDO
- IFLA, FAO, UNISIST
- ICSU, IDRC, OECD

Recommended Books:

1. Grassian, E.S. (2005). Learning to lead and manage information literacy instruction. New York: Schuman Publishers.

2. Vickery, B.C. (1987). Information Systems. Washington: Butterworths.

3. Baman,P.(1993).Studies on Information Systems, Services and Programmes in India and abroad. Delhi: Ajnata.

4. Atherton, Pauline.(1997). Handbook of Information System and Services. Paris: UNESCO

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PAPER –VII

RESEARCH METHODOLGY AND STATISTICAL TECHNIQUES

UNIT –I: Introduction to Research

- Concept, meaning, need and process of Research
- Ethical aspect of research
- Types of research: Fundamental & Applied
- Research Problem and Research Design
- Hypothesis: Definition, Types, Sources and Functions
- Literature search : Print & Non-Print

UNIT –II: Research Methods, Tools and Techniques

- Research Methods: Scientific Method (Spiral of Scientific Method), Historical Method, Descriptive Methods(Survey and Case Study Methods), Experimental method
- Research Techniques & Tools : Questionnaire, Schedule, Interview, Observation, Scales and check lists
- Sociometric Techniques
- Sampling Techniques

UNIT –III: Data Analysis and Interpretation

- Descriptive Statistics :Measures of central tendency- mean, median, mode
- Tabulation and Generalization
- Measures of dispersion, Standard Deviation
- Graphical presentation of data – bar, pie, line graph, histograms
- Inferential statistics: Correlation, Regression- linear &non linear, chi-square test,
- Statistical package: SPSS

UNIT – IV: Bibliometrics, Scientometrics&Informetrics

- Concept and definition,
- Bibliometric laws (Bradford, Zipfs,Lotka), Bibliographic coupling, Citation analysis, Impact factor
- Webometrics
- Informetrics
- Scientometrics

UNIT –V: Research Reporting & Style Manuals

- Structure, Style, contents, guidelines for research reporting
- Style Manuals: Chicago, MLA, APA

Recommended Books:

1. Alvesson, M &Skoldberg, K. (2009). Reflexing Methodology: new vistas in qualitative research (2nd rev. ed.). London: Sage Publications.

2. Devrajan, G. (2011). Prolegomena to Research Methodology. New Delhi: EssEss Publishing.

3. Das,S. (2012). Research Methodology: methods, tools & techniques. Jaipur: Yking books.

4. Sharma, C.K. & Jain, M.K. (2009). Research Methodology. New Delhi: Shree Publishers.

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PAPER VIII

INFORMATION TECHNOLOGY APPLICATION (Theory)

UNIT - I: Information Technology

- Information Technology: genesis,definition ,need and objectives.
- Computer Technology : Processor Technology, Storage technology,
- Software:Meaning , definition Types, operating system Windows all version,Linux, Number system, Electronic Publishing: E-Journals , E- Books

UNIT -II: Network and Communication Technology

- Network: concept , meaning, Types of Network: LAN, MAN, WAN
- Modes of Communication: Simplex, Half Duplex, Full Duplex
- Network Topologies: Bus, Ring, Star, Hybrid
- Transmission Media: Twisted Pair, Coaxial cable,Optical fibers,Microwave, communication Satellite etc .
- Switching Techniques: Circuit switching, Message switching, Packet switching.
- Open system inter connection (OSI) model of networking, OPAC , Web OPAC

UNIT –III: Internet and Its services

- Internet: Origin , meaning , development and services
- Internet Protocols : Meaning, Different protocols-TCP/IP;FTP;HTTP; Z39.50
- Internet working tools: Bridges, Routers, Gateways, WebBrowsers
- Search Engines, meta search engine, Subject directories, Intranet , Extranet
- Bar coding Emergingtechnology:RSS, Smart Card, RFID

UNIT -IV: Database Concept and Components

- Database : concept ,meaning , features,Databasearchitecture
- DBMS: meaning ,Types,merit& demerits
- Databases in LIS: Web of Science, Google scholar, Scopus
- Dataware house, Dublin core metadata

UNIT -V: Digitization and Library Automation

- Digital Library:Concept ,Meaning, Definition, Objectives,Need and Functions
- Digitization:concept, needs and steps of digitization.
- Open source software v/sproprietary software
- Open sourceSoftware:DSpace,GSDL,KOHA
- Virtual Library:Meaning ,Definitions, Objectives,Need and Functions.

Recommended Books:

1. Singh, Prem and Khanna,JK.(1994). Information technology in the Libraries. Delhi: Pragati

2. Frye, Curtis. (2002). Microsoft Access Version 2002.Delhi: Prentice Hall.

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3. Parashar,R.G.(1991). Indian Library in IT environment. Ludhiana:Medallian press.

4. Blake.U Computer network:protocols, standard and interfaces 2nd edition, New Delhi: Prentice hall

5. Kresh,D.(2000).The Whole Digital Library:Handbook. New Delhi: Indiana Publishing.

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PAPER – IX

INFORMATION TECHNOLOGY APPLICATION: PRACTICE

- HTML programming: Web Page Creation
- Library Automation Softwares : KOHA, SOUL, Greenstone
- Content Management System :Joomla

Recommended Books:

1. Powell, Thomas A. (2001). HTML: The Complete Reference. USA: McGraw-Hill.

2. Mishra, L. &Srivastava V. (2008). Automation and Networking of Libraries: A Manual of Library Management Software and Application of Computer Technology in Libraries. New Delhi: New Age International Pub.

3. Lynch, P.J. & Horton, S. (2009). Web style guide: basic design principles for creating web sites. London: Yale University Press.

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(X c) Advanced Phycology.

(X d) Environmental Science.

Students shall have to undertake at least one field trip for field work/collection and submit a report on the same for which a provision of 15 marks shall be made out of the 30 marks allotted for Record/Collection/Herbaria etc.

M.Sc. (Previous) Botany

First Paper: Cytology, Genetics, Plant Breeding and Elementary Bio-Statistic

UNIT: I

Cytology: Structural organization of plant cell: Origin structure and importance of cell wall, plasmamembrane, chloroplast, mitochondria, ribosomes endoplasmic reticulum, golgi body, microbodies, lysosomes, nucleus and nucleolus. Cell cycle, cell division and cytokinesis.

Chromosomes: Structure,packaging of DNA, nucleolus, euchromatic and heterochromatin. Specialized type of chromosomes: polytene, lampbrush, B-chromosomes and sex chromosomes.

UNIT: II

Genetics: Mendelism and gene interaction. Non-Mendelian inheritance.

Variations: Chromosomal aberrations and their implications in meiosis. Polyploids: Induction and origin. Different types of polyploidy and their role in plant breeding and evolution of crop plants.

Mutations: Spontaneous and induced mutations, Physical and chemical mutagens, molecular basis of mutations. Role of mutations in crop improvement. DNA damage mechanisms and repair. Transposable elements in prokaryotes and eukaryotes.

Site directed mutagensis. The structure and behaviour of different types of DNA and RNA. Genetics of bacteriophages,bacteria and Neurospora.

Modern concept of genes: Chemical structure, composition and behaviour of different types of DNA and RNA,s. Gene action: Genetic code and regulation of gene activity in prokaryotes and eukaryotes.

UNIT: III

Plant Breeding: Method of plant breeding, Graft-hybrid and chimeras. Interspecific and intergeneric hybridization. Knowledge of plant breeding work done in India specially with reference of wheat, paddy, sugarcane, cotton, potato, Cajanas, Bengal gram and Brassica. Genetic basis of inbreeding and heterosis. Exploitation of hybrid vigour.

Elementary Bio-Statistics: Measure of dispersion, variation, standard deviation and error. Test of significance, t-Test, X^2 Test. F-Test: analysis of variance (Mono and bivariant). Regression and co-relation.

Second Paper: Biotechnology and Genetic Engineering of microbes and plants.

UNIT: I

Biotechnology: Basic concepts, principles, scope and potentials.

Plant cell and tissue culture: General Introduction, history, scope, concept of cellular differentiation and totipotency.

Application of plant tissue culture: Clonal propagation, synthetic seeds, production of hybrids and somaclones, production of secondary mtabolites/natural products, cryopreservation and germplasm storage.

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Organogenesis and adventive embryogenesis: Fundamental aspects of morphogenesis, somatic embryogenesis and androgenesis, gynogenesis, mechanisms, techniques and utility.

Somatic hybridization: Protoplast isolation, fusion and culture, hybrid selection and regeneration, possibilities, achievements and limitations of protoplast research.

Recombinant DNA technology: Gene cloning principles and techniques, construction of genome/cDNA libraries, choice of vectors, DNA synthesis and sequencing, polymerase chain reaction, DNA finger- printing.

UNIT: II

Genetic Engineering of plants: Aims, strategies for the development of transgenics (with suitable examples). Agrobacterium in the natural genetic engineering, t-DNA and transposon mediated gene tagging, chloroplast transformation and its utility, intellectual property rights, possible socio-ecological risks and ethical concerns.

Microbial genetic manipulations: Bacterial transformation, selection of recombinants and tranformants, genetic improvement of industrial microbes and nitrogen fixers, fermentation technology.

Genomics and Proteomics: Genetic and physical mapping of genes, molecular markers for introgression of useful traits artificial chromosomes, genome projects, bioinformatics, functional genomics, protein profiling and its significance.

UNIT: III

Tools and Techniques for Biology: Principles and uses of analytical instruments–pH meter, calorimeter, spectrophotometer, ultracentrifuge, densitometer, atomic absorption spectrophotometer, Microscopy – Principles and uses of light and electron microscopes. Microphotography. Microbial

techniques – media preparation, inoculation and growth monitoring, biochemical mutants and their uses, microbial essays. Cryotechniques – Cryopreservation of cells tissues and organisms. Separation techniques in biology – Chromatography, Electrophoresis. Organelle separation by centrifugation. Density gradient centrifugation. Radio-active isotope tracer techniques.

Third Paper: Diversity of viruses, Bacteria, Lichens, Fungi and Elementary Plant Pathology.

UNIT: I

Bacteria: Archaebacteria and Eubacteria. General account of bacteria, their occurrence, ultra-structure, nutrition, forms, reproduction, classification, and economic importance.

Viruses: A general account of plant viruses with special reference to their nature, ultrastructure, symptomatology, methods of transmission, multiplication and economic importance. Bacteriophases, TMV.

Mycoplasma: General characteristics, structure and their role in causing plant diseases.

Lichens: A general account of lichens with particular reference of their mode of life, structure, reproduction, classification, nutrition and economic importance. A brief account of Cladonia, Parmelia, Usnea, Peltigera, Rocella.

UNIT: II

Fungi: General characteristics of fungi and substrate relationship. Cell ultra-structure, unicellular and multicellular organizations. Cell wall composition, nutrition (saprobic, biotrophic, symbiotic). Reproduction (vegetative, asexual and sexual). Heterothallism, heterokaryosis and parasexuality. Phylogeny, inter-relationship and recent trends in classification. Economic importance of fungi. Mycorrhiza, Rhizosphere.

A brief study of following types: Myxomycetes: Physarum, Dictyostelium or any other allied form. Phycomycetes:

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Synchytrium, Allomyces, Monoblepharis, Saprolegnia, Pythium, Phytophthora, Perenospora, Sclerospora, Albugo, Entomophthora and Mucor. Ascomycetes: Taphrina (Exoascus), Protomyces, Aspergillus, Neurospora, Penicillium, Erysiphe, Xylaria, Claviceps, Ascobolus, Peziza, Morchella. Basidiomycetes: Ustilago, Tolyposporium, Sphacelotheca, Urocystis, Graphiola, Melempsora, Puccinia, Phragmidium, Uromyces, Polyporus, Coprinus, Lycoperdon, Deuteromycetes: Colletotrichum, Helminthosporum, Alternaria, Cercospora, Fusarium.

Elementary plant pathology: General principles, classification of plant diseases, symptoms of fungal bacterial and viral diseases. Disease management, forecasting and defense mechanism. Principles of plant disease control (chemical and biological).

Fourth Paper: Diversity of Cyanobacteria, algae and Bryophytes.

UNIT: I

Cyanobacteria and Algae: A general account of occurrence, structure, nutrition, reproduction and life cycles and classification. Ultra-structure of cell, flagella, eye-spot and chloroplast. Pigmentation and reserve food material. Origin, evolution, phylogeny and classification - endosymbiotic theory of origin of algal cell. Saliant feature of major phyla of algae. Algal blooms, bio-fertilizers and Economic importance of algae. Toxic algae. Bioluminiscence and Fossil algae.

A brief study of the following types: Microcystis, Oscillatoria, Lyngbya, Nostoc Anabaena, Gloeotrichia ,Scytonema ,Porphyra, Batrachospermum, Gelidium, Corallina, Gracilaria, Polysiphonia,. Chlamydomonas, Gonium, Pandorina, Eudorina, Volvox, Chlorococcum, Chlorella, Scenedesus ,Oocystis, Pediastrum, Hydrodiction, Ulothrix, Ulva, Sphaeroplea, Stigeoclonium, Draparnaldiopsis, Fritschiella, Cladophora, Pithophora, Valonia, Coleochate, Oedogonium, Bryopsis,

Caulerpa, Codium, Helimeda, Acetabularia, Trentopohlia, Zygnema, Mougeotia, Sirogonium, Cosmarium, Chara and Nitella. Botrydium, Voucheria, Navicula, Ectocarpus, Cutleria, Laminaria, Sphacelaria, Dictyota, Sargassum.

UNIT: II

Bryophytes: Morphology, structure reproduction, life history and distribution of Bryophytes. Fossil history, origin, evolution, phylogeny affinities and inter-relationships. A general account of Calobryales, Marchantiales, Jungermanniales, Anthocerotales, Sphagnales, Funariales and Polytrichales. Economic and ecological importance of Bryophytes.

A brief study of structure and reproduction of following types: **Hepaticopsida:** Sphaerocarpus, Riella, Marchantia, Lunularia, Targionia, Plagiochasma, Cyathodium, Dumortiera, Conocephalum, Fimbriaria Pellia, Riccardia, Medotheca, Calobryum, **Anthocerotopsida:** Anthoceros, Notothylus. **Bryopsida:** Sphagnum, Andreaea, Funaria, Buxbaumia, Pogonatum.

Fifth Paper: Diversity of Pteridophytes, Gymnosperms and Palaeobotany

UNIT: I

Pteridophyta: Morphology, anatomy, reproduction and life histories. Evolution of Stellar system. Heterospory and evolution of seed habit. A general account of fossil Pteridophytes. Affinities and classification. Economic importance of Pteridophytes.

A brief study of following types **Psilophytopsida:** *Rhynia, Hornsophyto, Psilophyton, Zosterophyllum.* **Psilopsida:** *Psilotum, Tmesipteris.* **Lycopsida:** *Protolepidodendron, Lycopodium, Selaginella ,Isoetes, Lepidodendron, Bothrodendron, Pleuromeia, Lepidocarpon, Miadesmia.* **Sphenopsida:** *Hyenia, Calamophyton, Sphenophyllum, Cheirostrobus, Calamites, Equisetum.* **Pteropsida:** *Botryopteris, Stauropteris.*

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Etapteris,Ophioglossum, Botrychium, Marattia, Angiopteris Osmunda, Schizaea, Lygodium, Gleichenia, Matonia, Dicksonia, Cyathea ,Polypodium, Alsophila, Dryopteris, Adiantum, Asplenium, , Marsilea, Salvinia, Azolla.

UNIT: II

Gymnosperms: A general account of occurrence, morphology, anatomy and reproduction, origin, evolutionary trends, affinities, inter-relationships and classification of gymnosperms. Distribution of Gymnosperms in India. Economic importance of gymnosperms.

A brief account of structure and reproduction of following types: **Pteridospermales:** *Lyginopteris, Heterangium, Medulosa, Trigonocarpus.* **Caytoniales:** *Caytonia,* **Cycadales:** *Cycas.* **Nilsoniales:** *Nilsonia.* **Bennettitales:** *Williamsonia,* **Pentoxylales:** *Pentaxylon.* **Cordaitales:** *Callixylon, Cordiates, Poroxylon,* **Ginkgoales:** *Ginkgo.* **Coniferales:** *Lebachia, Pinus, Abies, Cedrus, Araucaria, Cryptomeria, Taxodium, Cupressus, Thuja, Podocarpus, Cephalotaxus, Taxus.* **Ephedrales:** *Ephedra.* **Welwitschiales:** *Welwitschia.* **Gnetales:** *Gnetum.*

UNIT: III

Palaeobotany: Formation of plant fossils, modes of preservation, methods of fossil study and their importance in stratigraphy and economic geology. Nomenclature, reconstruction, and age of fossils. Index fossils. Fossiliferous beds of India and Palaeoclimate. Standard stratigraphy scale, succession of representative floras in different geological era and their bearing on plant morphology and evolution.

Scheme of M.Sc. Previous Practical Examination

The Practical examination shall be of twelve hours during spread over two days and will consist of following:

Time: 12 hours Maximum marks: 200

1.	Isolation and study of any four of the component of the mixture (A) provided. Identification of the material with the help of suitable temporary preparations diagrams and comments.	16
2.	A monographic study of the provided material (B) with the help of temporary slides, comments and anatomical diagrams (Bryophytes).	14
3.	Identification and study of the provided material (C) with the help of suitable doubles stained preparation, sketches and comments (Pteridophytes).	12
4.	A monographic study of the provided material (D) with the help of suitable double staining permanent preparation. Identification of the material giving diagrams, comments and reasons(Gymnosperms).	18
5.	Study of host parasite relationship in the provided material (E) and identification of the parasite with the the help of temporary preparations giving suitable diagrams, reasons and comments (Parasitic fungi).	15
6.	Study and identification of the given material (F) with the help of temporary preparations, diagrams, reasons and comments. (Saprohytic Fungi)	10
7.	Preparation of acetocarmine smear of the provided material (G). Tracing out of any two stages/sub-stages of cell division, their identification giving suitable sketches and comments.	10
8.	Working out of the given genetical/biostatisticial problems.	10
9.	Emasculation of given floral bud (H) and descriptions of the technique with suitable sketches.	5
	OR	
	Description of the floral biology of the material provided.	
10.	Exercise on Chromatographic separation of pigments/amino-acids.	5

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11.	Exercise on tools and techniques.	5
12.	Minor project on course prescribed for 2nd paper	10
13.	Spotting: 1- 10 spots (Two drawn from each paper)	20
14.	Viva-voce	20
15.	Seasonals, Records, Collection, Field trips etc.	30

SUGGESTED LABORATORY EXCERCISES

(As suggested by U.G.C.)

1. Paper First.

1. Chromosomes techniques, pre-treatment ,fixation and staining techniques.
2. Study of various stages of meiosis and mitosis in suitable plant material.
3. Linear differentiations of chromosomes through banding techniques, such as G-banding, C-banding, Q- banding.
4. Orcein and Fuelgen of Salivary gland chromosomes.
5. Characteristics and behaviour of B-chromosomes using maize or any other appropriate material.
6. Induction of polyploidy using colchicines, different methods of application of colchicine.
7. Estimation of nuclear DNA content through microdensitometry.
8. Exercise on emasculation and pollination in the available plant material.
9. Study of floral biology of suitable material.
10. Numerical problems on Mendelian principles/ Non-Mendelian inheritance.
11. Biostatistical problems based on mean deviation, standard deviation and error, χ^2 , 't' , F-test, variance and correlation.

2. Paper Second

1. Excercises on Chromatographic techniques.
2. Demonstration, excercise and use of available tools and techniques detailed in Theory paper.
3. Isolation of micro-organisms from different sources.
4. Gram's staining in Bacteria.
5. Growth characteristics of Escherichia coli using planting and turbidimetric method.
6. Visits to various laboratories & research institutions and preparation of a report on the following exercises till facilities for the same are arranged: Isolation of protoplast from various plant tissues and testing of their viability, Demonstration of androgenesis in Dhatura, DNA Finger-printing and population mapping, Preparation of various types of culture media and cultures.

3. Paper Third.

1. A study of structure symptomology and reproduction of the available parasitic fungi prescribed in theory courses.
2. A study of structure, culture characteristics and reproduction of saprophytic fungi prescribed in theory course.
3. Identification of available fungal culture.
4. Identification of diseases caused by viruses, mycoplasmas and bacteria (symptomology and transmission).
5. Study and identification of available Lichens prescribed in theory course.

4. Paper Fourth.

1. Morphological and/or anatomical study of vegetative and reproductive structures and identification of the available materials prescribed in theory courses. (Algae & Bryophytes).

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5. Paper Fifth.

1. Morphological and anatomical study of vegetative and reproductive structures and identification of the available materials prescribed in theory courses (Gymnosperms and Pteridophytes).
2. Study and identification of fossil specimens and/or fossil slides.

BOOKS SUGGESTED FOR M.Sc. Part I.

Alberts B., Bray D., Lewis J., Raft M., Roberts K., Watson I.D., 1999, Molecular biology of cell. Garland Publ. Co., Inc., NY.

Alexopoulus C.J., Mims C.W., Blackwell M., 1996, Introductory Mycology. John Wiley & Sons Inc.

Asthana D.K. and Asthana M., 2001, Environment: Problems and Solutions. 2nd Edition, S.Chand and Co. New Delhi.

Atherly A.G., Girton J.R., McDonald J.F., 1999, The Science of Genetics. Saunders College Publ. Fort Worth, USA.

Bhatnagar S.P., Moitra A., 1966, Gymnosperms. New Age International Pvt. Ltd., New Delhi.

Buchanan B.B., Gruissem, W., Jones R.L., 2000. Biochemistry and Molecular Biology of plants. American Society of Plant Physiologists. Maryland, USA.

Burnham C.R., 1962, Discussion in Cytogenetics. Burgess Publishing Ci., Minnesota.

Busch H., Rothblum L., 1982, Volume X: The Cell Nucleus rDNA. Part A. Academic Press.

Clifton A., 1958, Introduction to the Bacteria. McGraw-Hill Book Co., NY.

De D.N., 2000. Plant cell Vacuoles: An Introduction . CSIRO Publication, Collingwood, Australia.

Fukui K., Nakayama S., 1996, Plant Chromosomes: Laboratory Methods. CRC Press, Boca Raton, Florida.

Glick, B.R., Thompson J.E., 1993. Methods in Plant Molecular Biology and Biotechnolgy. CRC Press, Boca Raton Florida.

Glover D.M., Hames B.D. (Eds), 1995. DNA cloning 1:A practical approach. Core Techniques, 2nd Edn. PAS, IRL pPress at Oxford University Press, Oxford.

Gunning B.E.S., Steer M.W., 1996, Plant cell biology: Structure and function. Jones and Bartlett Publ., Boston, Mass.

Hackett P.B., Fuchs J.A., Messing J.W., 1988, An Introduction to Recombinant DNA techniques: Basic experiments in gene manipulation. The Benjamin/Cummings Publ. Co., Inc Mento Park, California.

Hall J.L., Moore A.L., 1983. Isolation of Membranes and Organelles from Plant cell. Academic Press, London.

Harris N., Oparka K.J., 1994. Plant Cell Biology: A practical Approach. IRL Press, At Oxford Univ. Press, Oxford, UK.

Hart D.L., Jones E.W., 1998, Genetics: Principles and Analysis (4th Edition). Jones and Bartland Publ. Massachestts.

Karp G., 1999, Cell and Molecular Biology: Concepts and Experiments. John Wiley & Sons Inc. USA.

Khush G.S., 1973, Cytogenetics of Aneuploids. Academic Press, New York, London.

Kleinsmith L.J., Kish V.M., 1995. Principles of cell and Molecular Biology. (2nd Ed.) Harper Collins College Publishers, NY.

Krishnamurthy K.V., 2000. Methods in cell wall cytochemistry. CRC Press. Boca Raton, Florida.

Kumar H.D., 1988, Introduction to Phycology. Affiliated East-West Press Ltd., NewDelhi.

Lewin B., 2000, Genes VII. Oxford Univ.Press.New York.

Lewis R., 1997,Human Genetics: Concepts and Applications (2nd Edn.) WCB McGraw Hill, USA

Lodish H., Berk A., Zipursky S.L., Matsudaira P., Baltimore D., Darnell J., 2000, Molecular Cell Biology. Freeman and Co., NY.

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Malacinski G.M. and Freidfelder D.,1998, Essentials of Molecular Biology (3rd Edn.) Jones and Bartlet Publishers Inc. London.

Mandahar C.L., 1978, Introduction to Plant Viruses. S. Chand Co. Ltd. Delhi.

Mehrotra R.S., Aneja R.S., 1998, An Introduction to Mycology. New Age International Press.

Morris I., 1996, An Introductions to Algae. Cambridge University Press, UK.

Pandey S.N., Sinha B.K., Plant Physiology, Plant Physiology. Latest Edn. Vikas Publ. New Delhi.

Pandey S.N., Chada A., Plant Anatomy and Embryology. Latest Edn. Vikas Publ. New Delhi.

Pandey S.N., Chadha A., Economic Botany. Latest Edn. Vikas Publ. New Delhi.

Pandey S.N., Trivedi P.S., A Text Book of Algae. Latest Edn. Vikas Publ. New Delhi.

Parihar N.S., 1991, Bryophyta, Central. Book Depot, Allahabad.

Parihar N.S., 1996, Biology and Morphology of Pteridophytes, Cental Book Depot., Allhabad.

Puri P.,1980, Bryophytes. Atma Ram & Sons, New Delhi.

Rangaswamy G., Mahadevan A., 1999, Diseases of crop plants in India (4th Edn.) Prentice-All of India. Pvt Ltd. New Delhi.

Rost T., et al, 1998. Plant Biology. Wadsworth Publishing Co., California.

Round F.E., 1986, The Biology of Agae. Cambridge Univ. Press, Cambridge.

Russel P.J., 1988. Genetics (5th Edn.) The Benjamin/Cummings Publ. Co. Inc. USA.

Sharma A.K., Sharma A., 1999, Plant Chromosomes: Analysis, Manipulations and Engineerong. Harwood Academic Publ. Australia.

Shaw C.H. (Ed), 1988. Plant Molecular Biology: A practical Approach. IRL Press, Oxford.

Snustad D.P., Sommons M.J., 2000 Principles of Genetics (2nd Edn.). John Wiley and Sons Inc. USA.

Sporne K.K., 1991, The Morphology of Pteridophytes. B.I.Publishing Pvt. Ltd., Bombay.

Stewart W.N., Rathwell G.W., 1993, Palaeobotany and the Evolution of Plants. Cambridge University Press, Cambridge.

Webster, J., 1985, Introduction to Fungi. Cambridge University Press, Cambridge.

Wolfe S.L.,1993, Molecular and Cellular Biology. Wadsworth Publ. Co., California.

M.Sc. (Final) Botany

Sixth Paper: Taxonomy, structure and Reproduction of Angiosperms.

UNIT:I

Taxonomy of Angiosperms:

The species concept: Taxonomic hierarchy, species, genus, family and other categories, principles used in assessing relationship, delimitation of taxa and attribution of rank. Fossil history and phylogeny of Angiosperms.
Salient feature of the International Code of Botanical Nomenclature.

Taxonomic evidence: Morphology, anatomy, palynology, embryology, cytology, phytochemistry, genome analysis, and nucleic acids hybridization.

Taxonomic tools: Herbarium, floras, histological, cytological, phytochemical, serological, biochemical and molecular techniques. Botanical garden, Herbaria. Botanical survey of India.

Systems of angiosperm classification: Phenetic versus phylogenetic systems, relative merits and demerits of major systems of classification, relevance of taxonomy to conservation. Recent trends of classification.

UNIT:II

A study of following families:

1. Dicotyledons: Magnoliaceae, Annonaceae, Rosaceae, Fabaceae, Casurinaceae, Moraceae, Nyctaginaceae, Capparidaceae, Tamaricaceae, Violaceae, Cucurbitaceae, Caricaceae, Cactaceae, Telinaceae, sterculiaceae, Malvaceae, Linaceae, Euphorbiaceae, Myrtaceae, salvadoraceae, Oleaceae, Loranthaceae, Euphorbiaceae, Sapotaceae, Rutaceae, Meliaceae, Anacardiaceae, Apocynaceae, Asclepiadaceae, Rubiaceae, Bignoniaceae, Pedaliaceae, Verbenaceae, Ranunculaceae, Nymphiaceae, Piperaceae, Papavaraceae, Caryophyllaceae, Polygonaceae, Chenopodiaceae, Amaranthaceae, Lythraceae,

Primulaceae, Apiaceae, Asteraceae, Solanaceae, Convolvulaceae, Scrophulariaceae, Acanthaceae, Oxalidaceae, Boraginaceae, Lamiaceae.

2. Monocotyledons: Hydrocharitaceae, Commelinaceae, Musaceae, Zingiberaceae, Liliaceae, Araceae, Lemnaceae, Amarylidaceae, Palmceae, Orchidaceae, Cyperaceae, Poaceae.

UNIT:III

Morphology and Morphognesis: Meristems, organization of root and shoot apices. Anatomy of nodes, internodes. Primary and secondary structures of stem. Anomalous secondary growth. Cork cambium and its derivatives, function of cork, commercial cork. Anatomy of roots (primary and secondary structure), velamen. Anatomy of leaf, distribution and systematic significance of stomatal and cuticular structures. Morphological nature of the flower with special reference to stamen and carpel. Placentation, Organogeny and ontogeny of floral organs.

Embryology: Stamen, Anther, microsporogenesis and microgametogenesis. Gynoecium, ovule, megasporogenesis and megagametogenesis, its organization and nutrition. Fertilization. Endosperm, its haustoria and its morphological nature. Embryos (monocot and dicot), Apomixis, Polyembryony and artificial induction of adventive embryos, control of fertilization, induced parthenogenesis, induced parthenocarpy, ovary culture and embryogeny in relation to taxonomy.

Seventh Paper: Plant Ecology and Environmental Pollution.

UNIT:I

Climate, soils and vegetation patterns of the world: Life zones, major biomes and major vegetation of the world.
Soils, its origin, development, classification, structure, properties and fertility. Soil microflora and fauna. Ch. of soil types of India. Problem soils and their reclaimation.

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Vegetation Organization: Origin of intrapopulation variations, Population and environment, ecads and ecotypes, evolution and differentiation of species, various models. Concepts of community and continuum, analysis of communities (analytical and synthetic characters), community coefficients, inter-specific associations, ordination, concept or ecological niche.

Vegetation development: Temporal changes (cyclic and non-cyclic), mechanism of ecological succession (relay floristics and initial floristic composition, facilitation, tolerance and inhibition models), changes in ecosystem properties during succession.

Ecosystem organization: structure and functions, primary production (methods of measurement, global pattern, controlling factors), energy dynamics (trophic organization, energy flow pathways ecological efficiencies), litter fall and decomposition (mechanism substrate quality and climatic factors), global biogeochemical cycles of carbon, nitrogen, phosphorus and sulphur, mineral cycles (pathways, processes, budgets) in terrestrial and aquatic ecosystems.

Biological diversity: Concept, levels, importance and role of biodiversity in ecosystem functions and stability, speciation and extinction. IUCN categories of threat, distribution and global patterns. Megadiversity countries. Speciation and extinction and natural longitivity of a species and optimum biodiversity. Causes and consequences of degeneration of biodiversity and its repercussions on the future course of evolution.

UNIT:II

Pollution of environment By organic wastes, pesticides, heavy metals, mining & processing wastes and radioactive wastes. Bio-accumulation and bio-magnification,

Atmospheric inversion and pollution blankets. Photochemical smog. Acid rains.

Climatic change: Accumulation of green house gases, global warming and its causes consequences and control. Pollution of

Stratosphere, ozone layer, ozone hole and its consequences and control.

Soil pollution, loss of fertility and degradation of soils. Water pollution by organic wastes, its consequences, treatment and disposal. Eutrophication, the role of nitrogen and phosphorus and algal blooms. Oils spills ú associated problems and clean up operations.

Noise, Radioactive and thermal pollution.

Ecosystem stability: Concept (resistance and resilience), ecological perturbation (natural and anthropogenic) and their impact on plants and ecosystem. Ecology of plant invasion. Environmental impact assessment, methods, the cost of damages and its estimation. Ecosystem restoration.

Ecological management: Concept, sustainable development and sustainability indicators.

Concepts of Phytogeography: Endemism, hotspots and hottest hotspots; plant explorations; invasions and introduction, local plant diversity and its socio-economic importance. Vegetation and floristic regions of India.

Eighth Paper : Plant resource utilization and Conservation.

UNIT: I

Plant diversity: Concept and status in India, utilization and concerns.

Sustainable development: Basic objectives, concepts and strategies. Sustainable use and management of biotic and abiotic resources.

Origin of agriculture.

World centers of primary diversity of domesticated plants: The Indo-Burmese centre, plant introductions and secondary centre of origin.

Origin, evolution, botany, cultivation and uses of: 1.Food forage and fodder crops, 2.Fibre crops, 3.Medicinal plants and 4.Vegetable oil yielding crops.

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Important fire-wood and timber yielding plants and non wood forest products (NWFP): Such as bamboo, rattans, raw materials for paper making, gums, tannins, dyes, resins and fruits.

Green revolution: Benefits and adverse consequences.
Plants used as avenue trees for shade pollution control and aesthetics.

UNIT: II

Principles of conservation. Extinctions. Environmental status of plants based on International Union for Conservation of nature.

Strategies for conservation: 1. In-situ conservation: Principles, practices, advantages and disadvantages. Ideal protected area, its requirements - sanctuaries, national parks, biosphere reserves, wetlands, mangroves, coral reefs. Short comings in the existing system. Management of a protected area. International efforts and Indian initiative. Protected areas in India - for conservation of wild biodiversity. Conservation beyond parks, sanctuaries and reserves. Restoration of degraded habitat.

Strategies for conservation: 2. Ex-situ conservation: Principles, practices, advantages and disadvantages. Conservation of biological diversity in botanical gardens, field, gene-banks, seed banks, in-vitro repositories, cryobanks. Short coming and controversies. General account of the activities of Botanical survey of India (BSI), National Bureau of Plant Genetic resources (NBPGR), Indian Council of Agricultural Research (ICAR), Council of Scientific and Industrial Research (CSIR), The department of Biotechnology (DBT) for conservation, non-formal conservation efforts.

Ninth Paper: Physiology and Biochemistry.

UNIT:I

Plant Physiology and metabolism:

Structure of plant cell with special reference to functional aspects of cell, plasmamembrane, chloroplasts, mitochondria, ribosomes, endoplasmic reticulum, golgi bodies, peroxysomes, vacuoles and nuclei.

Water relations: water movement (water potential, solute potential, pressure potential, diffusion, osmosis, electro-osmosis). Water relations of cell and tissues with reference to idealized cell with an elastic wall. Water movement: through soil across roots, structure form and function of water, active and passive water absorption. Water movement through the vascular system of roots, stem and leaves with reference to the recent theories of ascent of sap.

Transpiration mechanisms: pathways of water vapour loss, (stomatal, cuticular, lenticular). Theories of stomatal movement, guttation, anti-transpirents, significance of transpiration.

Ionic relations: Ion transport and membrane structure (amphipathic membrane constituents, membrane protein and ion transport), Driving forces of ion (electrochemical potential gradient and diffusion, direction of active transport. Theories of ion uptake, active and passive uptake.

Mineral nutrition: a brief outline of micro and macronutrients and their deficiency symptoms.

UNIT:II

Photochemistry and Photosynthesis: General concepts and historical background, evolution of photosynthetic apparatus. Photosynthetic pigments and light harvesting complexes, photo-oxidation of water, mechanisms of electron and proton transport. Carbon assimilation and the Calvin Cycle, photo-respiration and its significance, the C_4 cycle, and the CAM pathway physiological and ecological considerations.

Respiration and lipid metabolism: Overview of plant respiration, glycolysis, the TCA cycled, electron transport and ATP synthesis, pentose phosphate pathway, glyoxylate cycle, alternative oxidase system.

Nitrogen fixation, nitrogen and sulphur metabolism:
Overview, biological nitrogen fixation, nodule formation and nod

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factor, mechanism of nitrate uptake and reduction, ammonium assimilation, sulphate uptake transport and assimilation.

Membrane transport and translocation of solutes: Comparison of xylem and phloem transport, phloem loading and unloading, membrane transport of proteins.

Plant growth regulators and elicitors: Physiological effects and mechanisms of action of auxins, gibberellins, cytokinins, ethylene, abscisic acid, brassinosteroids, polyamines, jasmonic acid and salicylic acid , harmone receptors, signal transduction and gene expression.

Signal Transduction: Overview, receptors and G-proteins, phospholipids signaling, role of cyclic nucleotides, calcium-calmodulins cascade, diversity in protein kinesis and phosphatases, specific signaling mechanisms, e.g., two component sensor-regulator system in bacteria and plants, sucrose-sensing mechanisms.

The flowering process: Photoperiodism and its significance, endogenous clock and its regulation, floral induction and development of genetic and molecular analysis, role of vernalization.

Stress physiology: Plant responses to biotic and abiotic stress, mechanisms of biotic and abiotic stress tolerance, water deficit and drought resistance, salinity stress, metal toxicity freezing and heat stress, oxidative stress.

UNIT:III

Biochemistry:

Fundamentals of Enzymology: General aspects, allosteric mechanism, regulatory and active sites isozymes, kinetics of enzymatic catalysis. Michaelis-Menten equation and its significance.

Energy flow: Principles of thermodynamics, free energy and chemical potential, redox reaction, structure and function of ATP. A brief outline of classification, function and importance of carbohydrates and lipids.

Proteins: Structural organization, classification of aminoacids. Primary secondary and tertiary structure of proteins. Biosynthesis of Proteins.

Pigments: Chlorophylls, Phycobiliproteins, carotenes and xanthophylls. Biosynthesis of Chlorophyll a & b.
Chemistry and biosynthesis of Nucleic acids.

Tenth Paper: Special papers/ Project Work.

(X a) Advanced Plant Pathology.

(X b) Cytogenetics and Plant Breeding.

(X c) Advance Phycology.

(X d) Environmental Science.

(X a) Advanced Plant Pathology.

(X a) Advanced Plant Pathology.

UNIT: I

1. History of plant Pathology. Concept and component of plant diseases. Types and causes of plant diseases.
2. Production and dispersal of inoculum and predisposition factors (Its development in relations to Environment).
3. Physiology of parasitism (Pre-penetration, penetration, post-penetration phase).
4. Role of Enzymes and toxins in disease development.
5. Defence mechanism (structural and biochemical).
6. Epiphytotics and disease forecasting.
7. Management of Disease: Prophylaxis and immunization. Plant quarantine, Physical methods of plant disease control. Biological control. Fungicides and Chemotherapy. Means of securing resistant varieties.
8. Preparation of media: Koch's postulates. Isolation, inoculation and pathogenicity.
9. Genetics of Pathogenesis.
10. Breeding for disease resistance.

UNIT: II

Plant diseases and their control:

Wheat: Rust (Black Yellow and Brown), Loose smut, Bunt, Alternaria leaf spot, Tondu, Ear cockle. **Barley:** Covered smut, Molya disease. **Paddy:** Blast disease, Helminthosporium leaf spot, false smut, bacterial leaf blight, bunt, khaira, pansukh (tip-burn), ufra disease. **Maize:** Smut. **Sorghum:** Grain smut, head smut. **Bajra:** Green ear disease, smut, ergot. **Gram:** Rust, Blight. **Pea:** Powdery mildew, rust. **Arhar:** Wilt, yellow mosaic. **Bean:** Anthracnose. Ground nut: Tikka disease. **Linseed:** Rust, wilt. **Brassica:** Club root, White rust, Alternaria blight. Sesamum: Phyllody. **Sugarcane:** Red rot, whip smut, red strip, grassy shoot, mosaic. **Potato:** Late blight, mosaic, leaf roll, brown rot. **Cotton:** Angular leaf spot wilt. **Tobacco:** Mosaic. Cucurbits: Downy mildew, powdery mildew, mosaic disease. **Cabbage:** Alternaria blight, root knot. **Tomato:** Blight, leaf curl. **Bhindi:** Yellow vein. **Brinjal:** Little Leaf. Coriander: Stem gall. **Turmeric:** Leaf spot (Taphrina maculans). **Chillies:** Anthracnose, die back, leaf curl. **Onion:** Smut. **Mango:** Anthracnose, black tip. **Grapes:** Downy mildew. **Papaya:** Leaf curl. **Banana:** Bunchy top and Panama disease. **Citrus:** Canker, curling,gummosis.

(X b) Cytogenetics and Plant breading:

UNIT: I Cytogenetics.

Chromosomes: Structure and function normal prokaryotic and eukaryotic chromosomes, Karyotype analysis and their bearing on evolution. Chromosome banding patterns. Special forms of chromosomes: polytene, lampbrush, B-chromosomes and sex chromosomes. Cell cycle and behaviour of chromosomes during meiotic division, mechanisms and theories of crossing over, recombination models, cytological basis and role of synaptonemal complex.

Structural changes in chromosomes: Deficiencies and duplication, inversion and translocation their cytological consequences, gene mapping and other uses.

Numerical variations in Chromosomes: Aneuploidy and Euploidy, classification, Cytogenetics, segregations, evolutionary significance and uses in basic and applied research. Synthesis of natural and new polyploids. Haplontic, Diplontic barriers and means to over come them.

Mendelian principles: Gene interactions, qualitative and quantitative characters, multiple allele hypothesis. Isoalleles, pseudoalleles and pleiotropism. Linkage, linkage detection and estimation in various organisms (Virus, Bacteria, Fungi and Eukaryotes). Mechanism of sex determination, sex-linked and sex influences and sex limited traits.

Modern concept of genes: Genetic material - nature, organization, fine structure of DNA, RNA. DNA content variations. Types of DNA sequences, unique and repetitive sequences. VNTRs minisatellites and microsatellites. DNA packaging in eukaryotic chromosomes, Genomics in prokaryotes and eukaryotes. Organelle genome, gene amplification and its significance. Mechanisms of DNA replication and recombination in prokaryotes and eukaryotes. DNA sequencing, split genes, alternative splicing, trans-splicing, pseudogenes, overlapping genes, nested genes,

Mechanism of transcription and its regulation in prokaryotes and eukaryotes, enhancers, suppressors, transcriptomes, transcription factors and their role. mRNA processing, ribozymes and RNA editing. Translation or protein synthesis in prokaryotes and eukaryotes, ribosomes, tRNA and translational factors, proteiomics.

Genetic codes: gene regulation in prokaryotes and eukaryotes. Environmental influence on gene expression, transpososes and their influence on gene expression.

Extra-chromosomal inheritance, interactions among nuclear, mitochondrial and chloroplast genomes.

Population genetics: Hardy Weinberg equilibrium, changes in genes and genotypes frequencies under selection, migration, mutation and genetic drift. Quantitative inheritance.

Mutation: a general account with special reference to gene

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mutations. Experimental mutagenesis - physical and chemical mutagens and mode of their action. Somoclonal variations, biochemical mutations, frame shift. Repair of mutagenic damage. Screening techniques and selection procedures of induced mutations.

UNIT: II Plant breeding:

Methods and Objectives of Plant Breeding

Introduction, domestication and acclimatization. Patterns of evolution in crop plants. Centres of origin, gene pool, concept and gene introgression. Plant genetic resources, collection, evaluation and conservation of germ plasm. Gene banks.

Selections: different methods of selection, criteria of selection, selection limits, multitrait selection and construction of selection index.

Hybridization: Breeding methods of self, cross pollinated and vegetatively crops, pedigree and bulk selection. Mass selection, recurrent selection and population improvement. Breeding composite and synthetic populations. Methods of breeding for disease, pest and drought resistance.

Heterosis - concept and theories. Inbreeding depression. Development and improvement of heterotic pools and inbreed lines. Genetics of self-incapatiblity. Production of hybrid seeds. Male sterility and its restoration mechanisms in hybrid breeding. Genetic characteristic of pureline, inbred lines, hybrids, clones, mixtures and multilines composites and synthetics, their mainetance and multiplication Heritability and genetic advance.

Mutation breeding and distant hybridization in plant breeding. Use of polyploidy in plant breeding.

Biotehnology and genetic engineering in relation to crop improvement.

Crop improvement in wheat, maize, paddy, sugar cane, pulses, oil seeds, potato and cotton with reference to work done in India.

(X c) Advanced Phycology.

UNIT: I General Aspects:

1. Nature of Oceanic algal life
2. Distribution pattern of marine algal forms on Indian sea coast.
3. Isolation, purification, culture and mass culture of algae.
4. Ecological habitats of algae, and influence of ecological factors on growth of algae.
5. Water blooms their importance in nature and control of algal nuisance.
6. Symbiotic associations with algae.
7. Biochemistry of algal pigments, reserve food material and cell wall composition,
8. Ultrastructure of algae of different phyla and modern systems of classification.

UNIT: II

1. Role of algae as food and fodder.
2. Role of algae in Industry.
3. Study of soil communities and role of terrestrial algae in relation to user land reclamation.
4. Role of algae in agriculture with reference to rice fields and biological nitrogen fixation.
5. Extra-cellular products of algae, growth promoting and growth inhibiting substances of algae with special reference to their role in the production of antibiotics.
6. Algae and environmental pollution with reference to water pollution and its role in municipal water supplies and industrial effluents. Algae as ecological indicators.
7. Sewage biology and role of algae in purification of sewage.
8. Effect of water pollutants especially industrial effluents on quantitative, qualitative growth and composition.

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9. Study algal virus with special reference to isolation and assay of cyanophages.
10. Control of undesirable algae.

(X d) Environmental Science:

UNIT:I

A brief outline of earth's environment and its evolution.

Atmosphere, its structure, composition and characteristics.

Hydrosphere, the aquatic environment, lotic and lentic systems, their physio co-chemical and biological characteristics

Lithosphere, its composition and characteristics. The rocks of earth's crust, their decomposition and the development of soil, its chemical and biological nature and properties.

Biosphere, its components, trophic structure and the impact of human activity on its constitution. Biological diversity, its importance, pattern of degeneration, causes and consequences of its diminution. Likely changes in future climate and their repercussions on the biological diversity and future course of evolution. Strategies for the conservation of biological diversity. A brief outline of the national and international conservation efforts being carried out by governments and non-government organizations.

Natural Resources: their types (fertile soils, fresh water, mineral and energy resources, live-stock, fisheries, forests and wild life). Finite nature of natural resources, their over exploitation and consequences thereg.

UNIT:II

Pollution of environment: Major types of pollutants biodegradable, non-degradable and persistent pollutants. Metabolism and environmental fate of pollutants. Bio-accumulation, bio-magnification and degradation of waste material. Bio-geochemical cycles of carbon, oxygen, nitrogen, phosphorus sulphur and changes induced by man and

consequences thereof. Efforts being done to stabilize the biogeochemical cycles.

Air pollution: Meteorological conditions and air pollution. Major pollutants of the atmosphere (Oxides of carbon, nitrogen and sulphur, ozone, hydrocarbons and particulates), their origin, effects on plant and animal life and clearance from the atmosphere. Causes, consequences and control of Global warming, Stratospheric ozone depletion, Photochemical smog and Acids rains.

Water Pollution: Domestic effluents, their characteristics, primary secondary and tertiary methods of their treatment and disposal. Industrial effluents, their characteristics, treatment and disposal. Crude oil pollution, problems caused by oil spills and their clean up operations. Effects of water pollution on aquatic life. Effect of pollution on productivity of the aquatic system and recovery from pollution.

Soil pollution: Origin, behaviour, treatment and disposal of pollutants of the soil with special reference to municipal garbage, pesticides, heavy metals (Lead, Mercury, Cadmium, Chromium, Arsenic, Copper and lead). Mining and processing wastes. Biological aspects of sanitary land fills and composting.

Thermal and noise pollution: Its causes and consequences and impact on living systems.

Radio-activity, its persistence and affects on biological systems. Consequences of enhanced levels of radio-activity on the biosphere.

Environmental degradation, emergence of public awareness and evolution of National and International Legal Framework to prohibit activities leading to degradation of environment and wild life.

UNIT: III

Environmental Management: Sustainable development - objectives and strategies. Control of environmental pollution, conservation of natural resources and wild-life.

Environmental monitoring: Monitoring of air, water and soil to assess the state deterioration of environmental quality. Biomonitoring and use of biological indicators of environmental quality.

Exposure of biological systems to environmental contaminants, its fate, absorption, behaviour and elimination. Exposure risk and Environmental impact assessment.

Environmental Education and its necessity.

Scheme of M.Sc. Final Practical examination;

M.Sc.Final practical examination shall be of 12 hours duration spread over two days and shall consist of a set of exercises of 150 marks for papers VI to IX and of 50 marks for special/elective papers/project work.

Time: 12 Hours **Max. marks: 200**

1.	Discription of two plant specimen provided in semitechnical language and their assignment to their respective systematic position (up to family level) giving suitable sketches, reasons, floral formula and diagrams.	4+4=8
2.	Preparation of double stained permanent slide of the angiospermic material. Description of the characters of anatomical interest. Identification giving reasons for the same.	8
3.	One exercises on embryology/morphology.	
4.	One exercise on provided material with the help of sections to study features of ecological interest.	4
5.	One exercise on the ecological experiment provided or experimental data provided.	8
6.	Two exercises or experiments on Environmental factors.	4+4=8
7	One exercise on Physiological experiment to be set up and described by the candidate	10
8.	Description of the principles involved and comments on one physiological experiment which has already been set.	6

9.	One exercise on biochemistry.	6
10.	One exercise on morphology/anatomy/microchemical test on food and forage crop.	6
11	One exercise on morphology/structure/microscopic study of any two fibres.	4+4=8
12.	Comments, identification importance and uses of any two plants of medicinal value.	4+4=8
13.	Practicals on Special/Elective Papers which shall consist of laboratory/field exercises, separate spotting and project work etc.	50
14.	Spotting (1-10 spots each of 2 marks).	20
15.	Viva - voce	20
16.	Record/Collections/Field trip/Project work etc.	30

SUGGESTED PRACTICAL EXERCISES FOR M.Sc. FINAL.

VI - Paper:

1. Detailed description and identification of locally available flowering plants of the families prescribed in theory course.
2. Study and observation on anatomy (normal and anomalous) of plant parts by sectioning, staining and preparation of permanent slides.
3. Preparation of smears for study of gametophytes and micro-dissections for study of embryos.
4. Study of various stages of reproduction in angiosperms from permanent slides.
5. Study of epidermal peals of Tradescantia /maize/wheat leaves etc. to understand trichomes, glands and stomata.
6. Study of leaf anatomy of C_3 and C_4 plants.
7. Study of live shoot apices by micro-dissections and sections.

VII - Paper:

1. Study of vegetation by point, transect and quadrant methods.
2. Study of environmental factors: Observations on selected physico-chemical parameters of air, water and soil quality.
3. Phytogeographical field trip to study natural vegetation of India.
4. Determination of water holding capacity of different types of soils.
5. Estimation of chlorophyll content in SO_2 fumigated and unfumigated leaves.

VIII - Paper:

1. **Food crops:** Morphology, anatomy and micro-chemical tests for stored food material in wheat rice maize, chick pea (Bengal gram), potato, tapioca, sweet potato and sugar cane.
2. **Fodder crop:** Study of any five important fodder crops of the locality.
3. **Medicinal plants:** Study of live or preserved or herbaria specimen or charts and photographs of the following medicinal plants to familiarize the students with the resource concerned:
   Papaver somniferum, Atropa belladonna, Catharanthus roseus, Adhatoda ceylonica (syn A.vasica), Allium sativum, Rauvolffia serpentina, Withania somnifera, Phyllanthus amarus, Andrographis paniculata, Aloe barbadense, Mentha arvensis, Rosa sp. Pogostemon rabling, Origanum vulgare, Vetiveria zizanioides, Jasminiam grandifolium, Cymbopogon sp. Pandanus odoratissimus.
4. **Vegetable oils:** Study of morphology and microscopic structure of oil yielding tissues of mustard, groundnut, soyabean, coconut, sunflower, caster etc. and determination of iodine number.

5. **Fibres:** Morphology anatomy and microscopic study of whole fibre, using appropriate staining procedures of cotton, jute, linen, sun-hemp, coir and silk.
6. Observations on tissues associated with production of gums, resins, tannins and dyes.
7. Minor project and field survey and visits to research laboratories. The students are expected to write a well illustrated report on the same.

IX - Paper:

1. To find out the O.P. of plant cell by plasmolytic methods.
2. To determine the D.P.D. (Water potential) of Potato tuber tissues by weighing method.
3. To determine the D.P.D. of storage tissues by density method.
4. To determine the structure size and frequency of stomata in mesophytic and xerophytic leaves.
5. To determine the rate of transpiration of plant twig: 1.Weight, 2.Potometer method.
6. To determine the rate of transpiration by Cobalt chloride method and to calculate transpiration index, transpiration efficiency of various leaves.
7. To study the effect of various factors on transpiration.
8. To measure the rate of photosynthesis in aquatic plants by Willmotts's bubble counting method.
9. To study the effect of different factors on the rate of photosynthesis in aquatic plants.
10. To study the effect of different factors on the rate of photosynthesis in leaves of land plant.
11. To extract major plant pigment from green leaves by differential solubility method.
12. To determine the chlorophyll a / chloro[illegible] b ratio in C_3 and C_4 plants.

13. To determine the Q_{10} for photosynthesis at two light intensities.
14. To compare the R.Q. of different plant material.
15. To separate the major plant pigments by paper chromatography/
16. To estimate the pigment content of plant tissues by Calorimetric method.
17. To extract free amino acids from germinating seedling by two dimensional paper chromatography.
18. To measure the amylase activity in germinating bean seedlings and to study the effect of substrate concentration, pH and temperature on enzymes.
19. To measure the activity of enzyme catalase by titration method.
20. To extract and test the presence of reducing sugars by Benedict Test.

X - Paper: Special Papers/Elective papers/Projects

(X a)- Advanced Plant Pathology:

1. A study of symptomology, histopathology and identification of pathogen included in the course.
2. A study of symptomology of bacterial viral and MLO diseases.
3. Methods of culture media preparation, sterilization and isolation of pathogens.
4. Inoculation and pathogenicity experiments.
5. Measurement of fungal spores.
6. Viral disease, mechanical transfer experiment.
7. Use of biological and chemical fungicides for disease control.
8. Demonstration of plant protection appliances.
9. Field collection of diseased plants and preparation of related projects.

(X b)- Applied Cytogenetics and Plant Breeding.

1. Exercises on mono- and trisomy and plant genotype, fertility and meiotic behaviour.
2. Meiosis of complex translocation heterozygotes.
3. Problems on Mendelian and non-Mendelian inheritance.
4. Problems on Gene-interaction, linkage and gene-mapping.
5. Analysis of quantitative inheritance.
6. Identification of various stages of meiosis, study of diakinesis.
7. Demonstration of crossing over/chiasmata.
8. **Karyotypic studies:** preparation of mitotic metaphase plates and drawing camera lucida drawing of chromosomes and study of chromosome morphology.
9. Cytological analysis of haploids (maize as a model crop).
10. Analysis of chromosome pairing in wheat and Rye hybrids.
11. Male sterility detection and maintenance of self-incapatibility
12. Estimation, heritability, genetic advance and variance with the help of given data.
13. Study of floral biology in relation to pollination in the available crop plants.

(X c)- Advanced Phycology:

1. Analytical study of Physical and Chemical characteristics of water and soils.
2. Culture and mass culture aspects of algal flora.
3. Isolation and identification of two components from a given algal mixture and comments on their economic importance.
4. Camera-lucida diagrams of algae with their measurements and identification of the species.
5. Project work on: a. Seasonal variations in algal flora of

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aquatic bodies, b. Influence of industrial effluents on growth and composition of algal flora, c. Maintenance of culture and mass culture of selected algae, d. Report on excursion trips for fresh water or marine algal forms.

(X d)- Environmental Science:

1. An Analysis of physicochemical parameters of environmental quality (air, water and soil) with reference to selected parameter.
2. Biological examination of polluted water: 1.Microscopic examination, 2.Microbial examination.
3. Project work on the allotted topic which shall involve collection of information, data, related to the local problems of environment, wildlife and its conservation.
4. Comparative study of floristic/morphological/anatomical characteristics of vegetation/plants from polluted and localities.
5. Seasonal variations in the biological/physicochemical quality of water from different localities.
6. Study of air microflora and particulate material in different seasons of the year.

BOOKS SUGGESTED FOR M.Sc. Part II.

Annonymous 1997, National Gene Bank: Indian Heritage on Plant Genetic Resources (Booklet). National Bureau of Plant Genetic Resources, New Delhi.

Annonymous, 1993, The Plant Cell. Special Issue on Reproductive Biology of Plants. The American society of Plant Physiologists, Rockville, Maryland, USA.

Arora R.K., Nayer E.R., 1984, Wild relatives of crop plants in India, NBPGR science Monographs No.7.

Asthana D.K. and Asthana M., 2001, Environment: Problems and Solutions. 2nd Edition, S.Chand and Co. New Delhi.

Atwell B.J., Kriedermann P.E., Jurnbull C.G.N. (Eds), 1999,

Plants in Action: Adaptation in Nature, Performance in Cultivation. McMillan Education, Sydney Australia.

Bajracharya D., 1999, Experiments in Plant Physiology: A Laboratory Manual. Narosa Publising House. New Delhi.

Baker H.G., 1978, Plants and Civilization (3rd Ed.) C.A.Wadsworth, Belmont.,

Begon M., Harper J.L., Townsend C.R., 1996, Ecology. Blackwell Scientific Publications, Cambridge, USA.

Bewley J.D., Black M., 1994, Seeds: Physiology of Development and germination. Plenum Press, NY.

Bhojwani S.S., Bhatnagar S.P., 2000, The Embryology of Angiosperms (4th Ed.), Vikas Publishing House, New Delhi.

Bhojwani S.S., Razdan M.K., 1996. Plant Tissue culture. Theory and Practice (Revised Ed.) Elsevier Science Publishers, NY, USA.

Bole P.V., Vaghani Y., 1986. Field guide to common Indian Trees. Oxford University Press, Mumbai.

Brady N.C., 1990, The Nature and Properties of Soils. MacMillan.

Brown T.A., Genomes. John Wiley & Sons (Asia) Pvt. Ltd. Singapore.

Buchanan B.B., Gruissem W., Jones R.L., 2000, Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists, Maryland, USA.

Burgess J., 1985, An Introduction to Plant Cell Development. Cambridge University Press, Cambridge.

Chandel K.P.S., Shukla G., Sharma N., 1996, Biodiversity in Medicinal and Aromatic Plants in India: conservation and Utilization. Nation Bureau of Plant Genetic Resources, New Delhi.

Chopra V.L., 2001, Plant Breeding: Field Crops. Oxford IBH Pvt. Ltd. New Delhi.

Chopra V.L., 2001, Plant Breeding: Theory and Practice. Oxford IBH Pvt. Ltd. New Delhi.

Chrispeels M.J., Sadava D., 1977, Plants Food and People. W.H.Freeman and Co. San Francisco.

Cole A.J., 1969, Numerical Taxonomy, academic Press, London

Conway G., 1999, The Doubly Green Revolution: Food for all in 21st Century. Penguin Books.

Conway G., Barbier E., 1994, Plant, Genes and Agriculture. Jones and Bartlett Publishers, Boston.

Cooper T.G., 1977, Tools in Biochemistry. John Wiley, New York, USA.

Davis P.H., Heywood V.H., 1973, Principles of Angiosperm Taxonomy. Robert E. Kreiger Pub. Co., NY

Dennis D.T., Turpin D.H., Lefebvre D.D., Layzell D.B. (Eds.) 1997, Plant Metabolism (2nd Edn.). Longman, Essex, London.

Devi P. 2000, Princples and Methods of Plant Molecualar Biology, Biochemistry and Genetics. Agrobios Jodhpur India.

Dryer R.L., Lata G.F., 1989, Experimental Biochemistry. Oxford University Press, NY.

Fageri K., Van der P.J.J. L., 1979, Principles of Pollination Ecology. Pergamon Press, Oxford.

Fahn A. 1982, Plant Anatomy (3rd Edn). Pergamon Press, Oxford.

Fosket D.E., 1994, Plant Growth and Development - A molecular Approach. Academic Press San Diago.

Frankel O.H., Brown A.H.D., Burdon J.J., 1995, The Conservation of Plant Diversity. Cambridge University Press, Cambridge.

Galston A.W., 1989, Life Processes in Plants. Scientific American Library, Springer Verlag, NY, USA.

Grant V., 1971, Plant Speciation. Columbia University Press, NY

Grant W.F., 1984, Plant Biosystematics. Academic Press, London.

Harrison H. J., New Concepts in Flowering Plant Taxonomy. Hieman Educational Books Ltd., London.

Haslop-Harrison J., 1967. Plant Taxonomy. English Language Book Soc. & Edward Arnold Pub. Ltd. UK.

Heywood V.H., Moore D.M., 1984, Current concepts in Plant Taxonomy. Academic Press London.

Heywood V.H., Watson R.T., 1995, Global Biodiversity Assessment. Cambridge University Press.

Hill M.K., 1997, Understanding Environmnetal Pollution. Cambridge University Press, Cambridge.

Hooyakaas P.J.J., Hall M.A., Lebbbenga K.R.(Eds.), 1999, Biochemistry and Molecular Biology of Plant Harmones. Elsevier, Amsterdem, The Netherlands.

Hopkins W.G., 1995, Introduction to Plant Physiology. John Wiley & Sons Inc. NY,USA.

Howell S.H., 1998, Molecular Genetics of Plant Development. Cambridge University Press, Cambridge.

Jones A.D, Wilbins A.D., 1971, Variations and Adaptations in Plant Species. Heinman & Co., Eucational Books Ltd. London.

Jones S.B.Jr., Luchsinger, A.E., 1986, Plant Systematics (2nd Edn.), McGraw-Hill Book Co. NY.

Kormondy J.L., 1996, Concepts of Ecology. Prentice-Hall of India Pvt. Ltd. New Delhi.

Kothari A., 1997, Understanding Biodiversity: Life sustainability and equity. Orient Longman.

Krebs C.J., 1989, Ecological Methodology. Harper and Row, NY.

Leins P., Tacker S.C., Endress P.K., 1988, Aspects of Floral Development. J.Cramer, Germany.

Lodish H.,Berk A., Zipursky S.L.,Matsudaira P., Baltimore D., Darnell J., 2000, Molecular Cell Biology. Freeman and Co., NY.

Lyndon R.F., 1990, Plant Development: The Cellular Basis. Unnin Hyman, London.

Magurran A.E. 1988, Ecological diversity and its measurement. Chapman and Hall, London.

Mason C.F., 1991, Biology of Freshwater Pollution. Longman.

Misra R.,1968. Ecology Workbook. Oxford & IBH New Delhi.

Molden B., Billharz S., 1997, Sustainability Indicators. John Wiley & sons, NY.

Moore P.W., Chapman S.B., 1986, Methods in Plant Ecology. Blackwell Scientific Publications.

Moore T.C., 1974, Research Experiments in Plant Physiology: A Laboratory Manual. Springer-Verlag, Berlin.

Moore T.C., 1989, Biochemistry and Physiology of Plant Harmones (2nd Edn,) Springer-Verlag, NY.

Muller-Dombois D., Ellenberg H., 1974, Aims and Methods of vegetation ecology. Wiley, New York.

Murphy T.M., Thompson W.F., 1988. Molecular Plant Development. Prentice Hall, New Jersey.

Nobel P.S., 1999, Physiochemical and Environmental Plant Physiology. (2nd Edn.), Academic Press,

Nordenstam B., El Gazally G., Kanssas M., 2000, Plant Systematics for 21st Century. Portland Press Ltd. London.

Odum E.P., 1971, Fundamentals of ecology. Saunders, Philadelphia.

Odum E.P., 1983, Basic Ecology. Saunders, Philadelphia.

Pielou E.C. 1984, The Interpretation of ecological data. Wiley, New York.

Plummer D.T., 1988. An Introduction to Practical Biochemistry. Tata McGraw-Hill Publsihing Co.Ltd. New Delhi.

Proctor M., Yeo P., 1973, The Pollination of Flowers. William Collins Sons, London.

Purohit S.S., 2002, Agricultural Biotechnology. (2nd Edn.). Agrobios, Jpdhpur.

Radford A.E., 1986, 1986, Fundamentals of Plant Systematics. Harper & Row Publications, USA.

Raghavan V., 1997, Molecular Embryology of Flowering Plants. Cambridge University Press, Cambridge.

Raghavan V., 1999, Developmental Biology of Flowering Plants (5th Edn). Worth, New York.

Salsbury F.B. and Ross C.W., 1992. Plant Physiology. 4th Edn. Wadsworth Publishing Co.California. San Diago, USA.

Sedgely M., Griffin A.R., 1989, Sexual Reproduction of Tree Crops. Academic Press, London.

Shivanna K.R., Johri B.M., 1985, The Angiosperm Pollen: Structure and Function. Wiley Eastern Ltd. NY.

Shivanna K.R., Rangaswamy N.S., 1992, Pollen Biology: A laboratory Manual. Springer-Verlag, Berlin.

Shivanna K.R., Sawhney V.K.(Eds), 1997, Pollen Biotechnology for crop production and improvement. Cambridge University Press, Cambridge.

Singh H., 1978, Embryology of Gymnosperms. In Encyclopaedia of Plant Anatomy X. Gebruder Bortraeger, Berlin.

Singhal G.S., Renger G., Sopar S.K., Irrgang K.D., Govindji, 1999, Concepts in Photobiology:Photosynthesis and Photomorphogenesis,. Narosa Publishing House. New Delhi.

Smith R.H., 2000, Plant Tissue Culture; Techniques and Experiments. Academic press NY.

Smith R.L., 1996, Ecology and Field Biology. Harper Collins, NY.

Solbrig O.T., Solbrig D.J., 1970, Population Biology and Evolution. Addison-Wesley Publicating Co. Inc. USA.

Stace C.A. 1989, Plant Taxonomy and Biosystematics (2nd Edn.) Edward Arnold Ltd. London.

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Stebbins G.L., 1974, Flowering plant - Evolution above species level. Edward Arnold Ltd. London.

Steeves T.A., Sussex I.M., 1989, Patterns in Plant Development (2nd Edn.), Cambridge University Press Cambridge.

Taiz L., Zeiger E., 1998. Plant Physiology (2nd Edn.) Sinauer associates Inc. Publishers. Massachusetts.

Takhtajan A.L., 1997, Diversity and Classification of Flowering plants. Columbia University Press, NY.

Thomas B., Vince-Prue D. 1997, Photoperiodism in Plants (2nd Edn). Academic Press, San Diago, USA.

Treshow M., 1985, Air Pollution and Plant Life. Wiley Interscience.

Waisel Y., Eishel A., Kafkaki U. (Eds.), 1996, Plant Roots: The Hidden Hall (2nd Edn.). Marcel Dekke - NY.

Walter K.S., Gillet H.J. 1998, 1997 IUCN Red List of Threatened Plants. IUCN: The world Conservation Union. Gland Switzerland and Cambridge, UK.

Westhoff P., 1998, Molecular Plant Development: From Genes to Plant. Oxford University Press, Oxford, U.K.

Wilson K., Walker J., 1994, Practical Biochemistry: Principles and Techniques (4th Edn.) Cambridge University Press, Cambridge, UK.

Woodland D.W., 1991, Contemporary Plant Systematics. Prentice Hall, New Jersey.

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M.Sc. Pre. - Zoology

ZOOLOGY

PAPER - I	Structure and function of invertebrates.	80 marks.
PAPER -II	Tools & Techniques for Biology, and Biotechnology	80 marks.
PAPER -III	Molecular Biology and Molecular Cytogenetics	80 marks.
PAPER -IV	Animal behaviour and Wildlife Conservation and Management	80 marks.
PAPER - V.	Bio statistics and Population Ecology	80 Marks
PRATICAL EXAMINATION		200 marks.

PAPER - I Structures and functions of Invertebrates.

Note: Attempt any four questions. All questions carry equal marks.

1. **Principles of Animal Taxonomy.**
   - (i) Species concept, international code of Zoological nomenclature.
   - (ii) Taxonomic procedures; new trends in taxonomy
   - (iii) Animal collection, handling & preservation.
2. **Organization of coelom**
   - (i) Acoelomates.
   - (ii) Preudocodomates
   - (iii) Coelomates; protostomia & Deuterostomia
3. **Locomotion**
   - (i) Flagella & ciliary movement in Protozoa

(ii) Hydrostatic movement in Coelenterate, Annelid & Echinoderm

4. **Nutrition & Digestion**
   (i) Patterns of feeding & digestion in lower metazoan
   (ii) Filter feeding in Polychaeta, Molluscs & Echinoderm.

5. **Respiration**
   (i) Organs of respiration; Gills, Lungs & trachea
   (ii) Respiratory pigments.
   (iii) Mechanism of Respiration.

6. **Excretion**
   (i) Organs of excretion; coelom, coellomoducts, nephridia & Malpighian tubules.
   (ii) Mechanism of excretion.
   (iii) Excretion & osmoregutation.

7. **Nervous system**
   (i) Primitive nervous system; coelenterate and Echnodermata.
   (ii) Advanced nervous system: Annelids, Arthropods (crustaceans & insects) & mollusks (cephalopod)
   (iii) Trends in neural evolution.

8. **Invertebrate Larvae**
   (i) Larval forms of free living invertebrates.
   (ii) Larval forms of parasites.
   (iii) Strategies and evolutionary significance of Larval forms.

9. **Minor Phyla**
   (i) Concept and significance.
   (ii) Organization & General Characters.

Recommended Books

Hyman, L.H. The invertebrates. Vol. I Protozoa through ctenophora, McGraw Hill Book Co. New York

The invertebrates. Vols. II, V and VIII. McGraw Hill Book Co. New York

Barrington, E.J.W. Invertebrate structure and function, Thomas Nelson and Sons Ltd. London

Jargenstein, G. Evolution of metazoan life cycle. Academic Press, New York and London

Barnes, R.D. Invertebrate Zoology. III edition, W.B.Saunders Co., Philadelphia.

Russel - Hunter, W.D. A biology of higher invertebrates, MacMillan Co. Ltd., London

Read, C.P. Animal Parasitism, Prentice Hall

Parker, T.J. and Haswell, W.A. Text Book of Zoology, Vol. I

PAPER - II: Techniques & Tools for Biology, and Biotechnology.

Note: Attempt four questions in all, two questions from each section; each question carries equal marks.

Unit I. Techniques and Tools for Biology

1. Principle of spectrophotometers, both UV and visible (Beer - Lambert Law), pH meter and GM counter.
2. Microscopy ù Light, phase contrast, transmission and scanning electron microscope, fluorescence microscopy
3. Histological techniques - Fixation, tissue processing, various embedding techniques Microtomes and their application in routine wax section cutting Principle and practice of double and triple staining
4. Photomicrography, its application and utility in biological research

4. Microbiology - General precautions in preparation of microbiologic media; Inoculation and growth curve of bacteria; Biological mutants and their significance
5. Cryotechniques - Principle of cryopreservation
6. Separation techniques : High speed and ultracetrifugation

   Analytical and preparative centrifugation

   Chromatography - Ion exchange, gel filtration, affinity chromatography,

   Electrophoresis

   Flow cytometry
7. Autoradiogaphy, liquid scintillation counter, and ĉerenkov radiation, RIA,ELISA

Biotechnology Unit - II

1. Scope and importance of biotechnology.
2. Tools of genetic engineering in health & medicine.
3. Hyb doma technology.
4. DNA recombination and expression in bacterial cell cloning, finger prints.
5. Cell and tissue culture in animals - cell line, primary culture, cell colonies.

Books recommended

John R.W. Masters (ed). Animal cell culture : A practical approach, Ed. IRL Press

Robert Braun. Introduction to instrumental analysis. Mac Graw Hill International Edition

K. Wilson and K.G. Goulding. A biologists guide to principals and techniques of practical biochemistry. ELBS ed.

R.W. Old and S.B. Primrose. Principles of gene manipulation: an introduction to genetic engineering

R.A.Meyers (Ed.). Molecular biology and biotechnology. VCH Publishers

Glick, Molecular biotechnology

M.D.Trevan et al. Biotechnology : The biological Principle. Tata MacGraw - Hill Co. Ltd, New Delhi

John E. Smith. Biotechnology. III ed. Cambridge University Press

PAPER - III : Molecular Biology & Molecular cytogenetics

Note: Attempt four questions in all, two questions from each section; each question carries equal marks.

Unit-I (Molecular Biology)

1. Structure of DNA - A, B and Z DNA.
2. 3 -D Structure of tRNA
3. DNA replication, emphasizing on role of various enzymes involved, in prokaryotic cells and its differences from eukaryotic cells; plasmids.
4. Prokaryotic transcription with special reference to lac operon
5. Post transcriptional modifications - 5' capping, 3-polyadenylation, splicing
6. Genetic code and Wobble's hypothesis
6. Mechanism of initiation, elongation and termination of transcription
7. Translation in prokaryotes and translational machinery
8. Post transcriptional modification, molecular chaperones
9. DNA damage and repair, xeroderma pigmentosum, mismatch repair and base excision repair

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Unit II - Molecular Cytogenetics

10. Organisation of DNA in chromosome, chromatin organization, solanoid organization
11. Structure of metaphase chromosome with special reference to importance of kinetochore and telomere
12. Heterochromatin - facultative and constitutive
13. Euchromatin and C -value paradox
14. Polytene chromosomes and lamp û brush chromosomes and their significance
15. Sex determination in insects and mammals, dosage compensation
16. Human chromosome karyotype
17. Banding in chromosomes û G, C,Q,R banding.
18. Structural and numerical aberrations and their significance - nullisomy, trisomy, poluploidy and related syndromes.
19. Heritable diseases in humans viz haemophilia, colour ûblindness, albinism etc.
20. Human genome project and formation of genomic DNA library
21. Impact of ionising and non - ionising radiation on genes and chromosomes.
22. Linkage, two point test cross
23. Cancer - protoncogenes and oncogenes

Books recommended

Atherly, A.G., J.R. Girlton, J.F. MacDonald. The science of Genetics. Saunders College Publishing Harcourt Brace College Publishers, New York.

Brooker, R.J. Genetics: analysis and principles, Benjamin/Cummings, Longman, Inc.

Gardener, E.J., M.J.Simmons and D.P.Snustad . Principles of genetics. John Wiley and Sons, New York

Lewin, B. Genes VI. Oxford University Press, Oxford, New York, Tokyo

Watson J.D. et al. Molecular Biology of genes. The Benjamin/Cummings Publishing Co. Inc., Tokyo

J.Darnell, H.Lodish and D.Baltimore. Molecular Cell Biology. Scientific American Books, W.H.Freeman, N.Y.

Benjamin Lewin. Genes VI, Oxford University Press, New York

P.D. Dabre. Introduction to Practical Molecular Biology. John Wiley and Sons Ltd. New York

PAPER - IV : Animal behaviour & Wild life Conservation and Management

Note: Attempt four questions in all, two questions from each section; each question carries equal marks.

Unit I (Animal behaviour)

1. Ethology as a branch of biology, innate behaviour.
2. Perception of the environment - Mechanical, Electrical, Chemical of factory, auditory and visual.
3. Neural and hormonal control of behaviour.
4. Genetic and environmental components of behaviour.
5. Communication - chemical, visual, light, audio, species, specificity of songs, evolution of langauge (Primates).
6. Ecological aspects of behaviour.
   - 6.1 Habitat selection, food selection, optimal foraging theory anti predator defenses.
   - 6.2 Aggression, homing, territoriality, dispersal most parasite relations.
7. Social behaviour
   - 7.1 Aggregations - Schooling in fishes, flocking in birds, herding in mammals.

7.2 Group selection, kin selection, altruism, and inclusive fitness.

7.3 Social organization in insects and primates.

8. Reproductive behaviour - Courtship, sexual selection parental care.

9. Biological rhythms -

9.1 Circadian and circannual rhythms.

9.2 Orientation and navigation

9.3 Migration of fish, turtles and birds.

9. Learning and memory : Conditioning, Habituation, insight learning, association learning, Reasoning.

Unit II Wild life conservation and management

1. Wild life as a resource.
2. Wild life action plan and its implementation.
3. Wild life conservation - In situ and ex-situ
4. Protected area - classification (National parks, sanctuaries) and management
5. Management of endangered species

5.1 Project Tiger

5.2 Project Elephant

5.3 Project crocodile.

5.4 Rhinoceros

6. Conservation strategies

IUCN - Criteria and technology

CITES; IBWL; WWF; WII

7. Wild life (Protection) Act 1972

7.1 Salient features.

7.2 Short comings of the Act

7.3 Amendments 1991

8. Administrative framework

8.1 Wild life advisory board

8.2 Chief wild life warden and power

8.3 Central zoo authority.

Books recommended

Wilson, E.O. Sociobiology: the new synthesis. Harvard University Press. Cambridge, Massachusetts, USA

Hinde, R.A. Animal Behaviour: a synthesis of ethology and comparative psychology, McGraw ûHill, New York

Alcock, J. Animal Behaviour : An evolutionary approach. Sinauer Association, Sunderland, Mass. USA

Gadkar, Stategies for survival.

Krebs, J.R. and N.B.Davies, Behavious ecology, Blackwell, Oxford, U.K.

Saharia, Wild life of India

Dasman, Wildlife biology.

Paper V- Biostatistics and Population Ecology

Note: Attempt four questions in all, two questions from each section; each question carries equal marks.

Unit I Biostatistics

1. Definition of population sample, random sample, presentation of data in form of graphs, line charts pie-charts, ban- graphs and histograms.
2. Measure of Central Tendencies - Mean, Median & Mode.
3. Measure of dispersion, ranges, mean deviation, variance standard deviation, standard error, coefficient of variation, correlation.

4. Test of significance - T- test, Chi-square test
5. Probability distribution, and their properties
6. Hypothesis testing
7. Analysis of variance
8. Correlation.

Unit II - Population Ecology.

1. Demography - Life tables, generation time, net reproductive rate, reproductive value.
2. Population growth.
   - 2.1 Growth of organisms with non-overlapping generations.
   - 2.2 Exponential growth, Verliat - Pearl logistic growth model.
   - 2.3 Stochastic and time lag models of population growth.
3. Predation
   - 3.1 Models of prey-predatory dynamics.
   - 3.2 Rate of predation in nature.
4. Competition and Niche Theory
   - 4.1 Intraspecific and interspecific competition
   - 4.2 History of niche concepts.
   - 4.3 Theory of limiting similarity.
5. Mutualism
   - 5.1 Evolution of mutualism.
   - 5.2 Animal - animal interactions.
   - 5.3 Basic models.
6. Population regulation - Extrinsic and intrinsic mechanism

Books Recommended

Sokal, R.R. and F.J. Rohlf. Biometry, Freeman, San Francisco, USA

Snedecor, G.W. and W.G. Cochran. Statistical Methods. Affiliated East - West Press, New Delhi

Began, M. et al. Ecology. Individuals, Populations and Communities. Blackwell Sci. Publi. Oxford, U.K.

Elseth, B.D. and K.M.Baumgartner. Population biology, Van Nostrand Co. New York

Krebs, C.J. Ecological methodology. Harper and Row, New York

M.Sc. Previous Zoology - Syllabus for Practical Examination

Note: The practical examination will be of 200 marks and the examination shall be spread over two days, with one session of five hours each day. Each candidate will submit a complete record of his practical work with collection, slides and preparations.

Both internal and external examiners will work in mutual consultation and cooperation during evaluation. The division of marks shall be as follows:

First Day Examination

1.	Dissection	20 marks
2.	Preparation of block of material provided in absolute alcohol/xylene	15 marks
3.	Section cutting and spreading	10 marks
4.	One permanent mount	05 marks
5.	Ten spots (lower non chordates only) for identification and comments	20 marks
6.	One exercise on genetical problems	10 marks
7.	One bio-statistic problem	10 marks
8.	Viva voce test	10 marks
	TOTAL	100 marks

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Second day Examination

1.	Dissection	15 marks
2.	Exercise on ecology / behavior	10 marks
3.	One cytological preparation	10 marks
4.	Staining of first days microtomic slide	05 marks
5.	Ten spots for identification and comments (higher non-chordates only)	20 marks
6.	Specific comments on any two instruments (tools, apparatus)	10 marks
7.	Viva voce test	10 marks
8.	Practical record	20 marks
	TOTAL	100 marks

Contents

Dissections - Nervous systems of Mytilus, Sepia, Loligo, Aplysia, Squilla Sea urchin (Aristotle/Es lantern), Holothuria (General anatomy)

Exercises on Methodology - a. Instructions on and practice of use of common biological instruments such as various light microscopes with sketching techniques, photomicrography, chromatography, electrophoresis,

pH meter, and colorimeter etc depending on availability.

b. Culture methods

c. Methods of studying biometrics of living animals

d. Preparation of fixatives, stains and other reagents.

Microtomy - Preparation of blocks, section cutting by wax method and staining of vertebrate and invertebrate tissues.

Mounts - Preparation of permanent stained mounts of various preserved mounting materials (to be provided) and also from the material collected by the students.

Spotting - Study of important prepared slides, museum specimens including those prescribed for B.Sc.; classification will follow as already taught in B.Sc.

Genetical problem - a. Test cross, b. back cross, c. dihybrid cross d. Multiple alleles, e. Sex linked inheritance, f. gene interaction.

Behavior - Orientation behaviour, phototaxis in earthworm and housefly, geotaxis in earthworm, chemotaxis, phototaxis in frog, olfactory behaviour in housefly.

Cytological Preparations ü Preparation of chromosomes from onion root tip, pollen mother cells (anther), testes of frog, and testes of grasshopper.

Biostatistics (Biometry) - a. Presentation of data in form of frequency table (direct variable continuous variable);

b. Measures of central tendencies (arithmetic mean, median mode, Standard deviation and numerical based on them).

c. Mean deviation, test of significance (t and χ^2 test) and numerical problems based on them and correlation coefficient.

Books, as prescribed for related topics will apply here for assistance in M.Sc. practical as well

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M.Sc. Final Zoology

PAPER - I Comparative Anatomy of vertebrates' (Compulsory)	80 marks.
PAPER - II Animal Physiology, Metabolic regulation and cell function (Compulsory)	80 marks
PAPER - III Gamete Biology and Developmental Biology (Compulsory)	80 marks
SPECIAL PAPERS (optional)	
PAPER - IV Special Paper	80 marks
PAPER - V Special Paper	80 marks
PRACTICAL EXAMINATION	200 marks

SPECIAL BRANCHES:

A. Ichthyology
B. Entomology
C. Parasitology
D. Cytogenetics
E. Endocrinology
F. Environmental Biology & applied Ecology.

PAPER - I: Comparative Anatomy of Vertebrates

Note: Attempt four questions in all, two questions from each section; each question carries equal marks.

1. Origin of chordates
   (i) Concept of protochordata
2. Origin and classification of vertebrates.
3. Vertebrate integument and its derivatives

   (i) Development general structure and function of skin and its derivatives.
   (ii) Glands, scales, horns, claws, nails, hoofs, feathers and hair.
4. General plan of circulation in various groups.
   (i) Blood (ii) Evolutions of heart (3) Evolution of aortic arches and portal systems.
5. Respiratory system
   (i) Characters of respiratory tissue
   (ii) Internal & External respiration
   (iii) Comparative account of respiratory organs.
6. Skeletal system:
   (i) Form, function, body size and skeletal elements of the body.
   (ii) Comparative account of jaw suspensorium, vertebral column.
   (iii) Limbs & girdles
7. Evolutions of urinogenital system in vertebrate services
8. Sense organs & function
   (i) Simple receptors
   (ii) Organs of olfaction and taste
   (iii) Lateral line system.
   (iv) Electro reception.
9. Nervous system
   (i) Comparative anatomy of the brain in relation to its functions.
   (ii) Comparative anatomy of spinal cord.
   (iii) Cranial nerves, peripheral & autonomous nervous systems.

Books recommended

Alexander, R.M. The Chordata. Cambridge University Press, London

Barrington, E.J.W. The Biology of Hemichordats and Protochordata. Oliver and Boyd, Edinburgh

Kingsley, J.S. Outlines of comparative anatomy of vertebrates. Central Book Depot, Allahabad

Srivastava, MDL. Comparative anatomy of vertebrates, Central Book Depot, Allahabad

Milton Hilderbrand. Analysis of vertebrate structure. IV ed. J.Wiley and Sons, New York.

Romer, A.S. Vertebrate Body. W.B.Saunders Co. Philadelphia.

Young, J.Z. Life of vertebrates, Oxford University Press, London

Life of Mammals, ----------do----------

Colbert, E.h. Evolution of vertebrates. J.Wiley and Sons, NY

Montagna, W. Comparative anatomy. J.Wiley and Sons, NY

PAPER - II: Animal physiology, metabolic regulation and cell function

Note: Attempt four questions in all, two questions from each section; each question carries equal marks.

Unit - I, Animal Physiology.

1. Aims and scope of animal physiology.
2. Respiratory organs and respiratory pigments.
3. Patterns of nitrogen excretion among different animal groups.
4. Osmoregulation in different animal groups.
5. Thermoregulation
   (i) Homoeothermic animals.
   (ii) Poikilotherms

   (iii) Hibernation.
6. Communication among animals
   (i) Bioluminescence
   (ii) Pheromones and other semiochemicals.
   (iii) Audio signals.
7. Contractile elements, cells and tissues.
   (i) Muscle structure and function.
   (ii) Movements - amoeboid, ciliary and flagellar
8. Chromatophores and regulation of their function.

Unit - II

(Metabolic regulation and cell function)

1. Thermodynamics principles and steady - state conditions of living organisms.
2. Degradation of glucose, palmitic acid and amino acids.
3. Energy metabolism and high-energy compounds
   (i) Redox potentials
   (ii) Mitochrondrial electron transport chain
   (iii) Oxidative phosphorylation.
4. Biosynthesis of urea, aspartic acid, glucose, glycogen and prostaglandins.
5. Nature of Enzymes: -
   (i) Classification and nomenclature of enzymes.
   (ii) Kinetic analysis of enzyme catalyzed reactions.
   (iii) Regulation of enzyme activity by non-genetic mechanisms.
   (iv) Half of enzymes intracellular degradation of proteins.
6. Biosynthesis of proteins and nucleic acids.
7. Site directed mutagenesis and enzyme engineering
8. Immobilized enzymes and their applications.

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Books recommended

C.L. Prosser. Comparative animal physiology. W.B. Saunders

R. Eckert. Animal Physiology: mechanisms and adaptation. W.H.Freeman

W.S. Hoar. General and comparative animal physiology, Prentice Hall, India

Schiemdt - Nielsen. Animal Physiology: Adaptation and Environment. Cambridge

D. Voet and J.G.Voet. Biochemistry. J.Wiley & Sons

De Robertis and De Robertis. Cell and Molecular biology

Paper III Gamete Biology and Developmental Biology

Unit I Gamete Biology

Note: Attempt four questions in all, two questions from each section; each question carries equal marks.

1. Heterogamy in eukaryotes
2. Comparative account of differentiation of gonads in a mammal and an invertebrate
3. Leydig cells
   a. Morphology
   b. Differentiation
   c. Function and its regulation
4. Spermatogenesis
   1. Morpholgical basis in Rodents
   2. Morphological basis in any invertebrate
   3. Gamete specific gene expression and genomics
5. Biochemistry of Semen
   1. Semen composition and formation
   2. Assessment of sperm functions
   3. Y-specific probes

9. Fertilization
   1. Pre-fertilization events.
   2. Biochemistry of fertilization
   3. Post-fertilization events.
10. Collection and cryopreservation of gametes and embryos
11. Ovarian follicular growth and differentiation
    1. Morphology
    2. Endocrinology
    3. Molecular Biology
    4. Oogenesis and vitellogenesis
    5. Ovulation and ovum transport in mammals.

Unit II Developmental Biology

1. Standard techniques and methods of experimental embryology namely - Vital dying, extirpation, isolation transplantation and grafting.
2. Role of nucleus, cytoplasm & yolk.
3. Multicellularity aggregation, differentiation, cell movement, contact inhibition, cell adhesives.
4. Cleavage, polarity, determination ingredients; cleavage and nuclear activity organizers- properties and physiology, embryonic induction primary and secondary competence heterogeneous inductions.
6. Metamorphosis, hormones and genes morphogenesis of vertebrates (the cyto differentiation with example of eye and limb).

Books recommended

Austen, C.R. and Short, R.V. Reproduction in animals.

Schatten and Schatten. Molecular biology of fertilization

F.T.Longo. Fertilization. Chapman and Hall

R.G.Edwards. Human Reproduction

Balinsky. An Introduction to Embryology, CBS College Publishers

Gilbert. Developmental Biology, Sinauer

Berril, N.J. Developmental biology. TMH, India.

M.Sc. Final

Zoology Practical Examination

Note: The practical examination shall carry 200 marks; 100 marks for first day (general examination) and 100 marks for second day (special paper). The examination shall be spread over two days, with one session of five hours each day.

Each student shall submit a brief report on excursion on special general papers (in the second day examination) along with the complete record of his / her practical work with collections, slides, and other preparations. Each student has to deliver at least one seminar lecture.

Both internal and external examiners shall work with mutual consultation and cooperation, during evaluation.

First day

1.	Major dissection	15 marks
2.	Minor dissection	10 marks
3.	Preparation of permanent mount	05 marks
4.	Ten spots for identification and comments	20 marks
5.	One physiology experiment	10 marks
6.	Comments in details on two embryological slides/models/specimens	10 marks
7.	One histological preparation/exercise	10 marks
8.	Viva voce test	10 marks
9.	Practical record, collection, slides and other preparations	10 marks
	TOTAL	100 marks

The second day practical will be held as per schedule provided for the concerned syllabi for special papers.

Contents of the Practical Exercises

Major Dissections - a. Fish: Cranial nerves of flat fish and Stingray, b. Mammal - Blood vascular system, cranial neck nerves.

Minor dissections - a. Fish: electric organs; b. Internal ear of Scoliodon; c. Reproductive organs of a mammal.

Mounts - WM of Salpa, Oikopluera, Squamous epithelium and ciliated epithelium of frog, filoplume of bird.
WM preparation of bird embryos.

Osteology - Endosskeleton of bony fish, reptiles, birds and mammals.

Palate in birds

Jaw suspension in vertebrates

Embryology - Study of various stages of embryos of representatives of different classes of vertebrates.
Study of different types of placentae (may be replaced by models) including their histological sections.
Sections of tadpole larvae through different regions of different stages.
Sections of various regions and stages of chick embryo and also their whole mounts.

Histology - Comparative histology of vertebrates organs including endocrine glands.

Museum Specimens - Models of extinct reptiles, human evolution, archaeopteryx, and other preserved specimens of chordates including those prescribed for B.Sc.

Physiology Experiments - a. Measurement of buffer action; b. Determination of osmotic concentration of a solution; c. To demonstrate the principle of dialysis; d. To determination of amount of dissolved oxygen in water; e. Effects of hormone on permeability of urinary bladder of frog; f. Oxygen consumption of an insect by an improvised

espirometer; g. Comparison of pulmonary and cutaneous respiration in frog; h. any other modification of above exercises or additional one depending on facilities available.

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SPECIAL PAPER - Ichthyology and fisheries

Paper IV (Ichthyology)

Note: Attempt four questions in all; each question carries equal marks.

1. Classification - Evolutionary classification (Classification prepared by Berg and that by Romer), merits and demerits of Borg's classification. Cladistic classification (Modern approach); Ostracoderms, placoderms.
2. Origin and evolution of fishes (Elasmobranchs and bony fishes)
3. Identification - Technique, identification of local fish fauna.
4. Zoogeography - Spatial distribution of fishes; discontinuous distribution;
5. Local Fish fauna - Food fishes, forage fishes, predatory fishes and insectivorous fishes, wood fishes.
6. Migration - Type of migratory fishes; physiologic and applied aspects of migration, influencing factors, associated problems; migrations of eels, migration of Salmon, migration of Hilsa.
7. Adaptive radiation - Hill stream adaptations, deep-sea adaptations, adaptations in bony fishes and elasmobranchs.

8. Food and feeding habits - basic food, secondary food, incidental food, obligatory food and supplimentary food. Plankton feeders, herbivorous, carnivorous, omnivorous, monophagic and stenophagic fishes, euryphagic fishes. Surface feeders column feeders, bottom fenders, grazers, strainers,
9. Reproduction and development - Seasonality; Prolific breeders; Oviparity and viviparity; fecundity (methods of enumeration of eggs); endocrinal regulation; embyrogenesis of any carp; parental care in fishes.
10. Abiotic factors and their influences on fish.
11. Maintenance and working freshwater and marine aquaria.

Paper V (A) - (Applied Fisheries)

Note: Attempt four questions in all; each question carries equal marks.

1. Type of fisheries - Marine fisheries (Costal fisheries, deep sea fisheries, off shore fisheries); Riverino fisheries (Major rivers systems of North India and their fisheries); reservoir fisheries; Laurtrine fisheries; estuarine fisheries estuary types, ecologic features, principal estuaries and their fisheries).
2. Prawn Fisheries - Fishing methods, culture method, future of prawn fishery in India; pollution and prawn fishery and processing of prawns.
3. Fishing Methods - Son water (crafts of east and west coast, tackles; other methods (electric fishing, light fishing, echo sounders); in in-land waters (fishing crafts and tackles);
4. Pond Culture (fish farming) - Types of fish farming, planning and construction fish forms, physiochemical and biological characteristic of fish farms; maintenance and improvement of fish form.

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5. Principal cultivable fishes - Brief account of indigenous and exotic spacious. Procurement of seed, collection, identification and transport of seed.
6. Induced breeding - Stripping, hypophysation technique, bund fisheries (dry and wet), indoor hatcheries and hapa techniques.
7. Other techniques of fish culture - Composite fish culture; fish culture in paddy fields; sewage fed fisheries.
8. Fish diseases and their control - fungal diseases, bacterial diseases, protozoan diseases, helminthes infections, and diseases induced by pollutants; prophylactic measures.
9. Fish decomposition and rigor mortis.
10. Fish preservation and processing - Causes of spoilage, methods of preservation and demerits of prevelent trivial methods.
11. Fish by-products.
12. Age and growth, length and weight relationship.
13. Tagging of fishes and population enumeration.
14. Transport of fish and marketing.

Syllabus for Practical examination to be held on second day

Note : The principal examination on second day will also extend for five hours; each student will maintain a record of the excursion and submit it at the time of this examination along with his collection and preparations.

The division of marks for practical examination on second day is as follows:

1.	Major Dissection	15 Marks
2.	Minor dissection	05 Marks
3.	Excursion report	20 Marks
4.	Ten spots for identification and comments	20 Marks

5.	Two local fresh water species for taxonomic identification with reasons up to species	10 Marks
6.	Comments on adaptive features of two fish species/two specimens for pathology/two models from applied fisheries.	10 Marks
7.	Viva voce test (on special paper only)	10 Marks
8.	Practical record, collections, slides and models.	10 Marks
	TOTAL	100

Syllabus for dissections and mountings: -

Major dissections - Cranial nerves of fresh water fish- Wallago attu, Mystus spe.
Weberian ossicles a fresh water fish
Exposure of pituitary a fresh water fish.

Minor dissections- Electric organs- Torpedo (Electric-ray)
Accessory respiratory organs- Heteropneusus, Anabus, Opheocaplalous.
Eye and eye muscles
Scroll valves.

Mountings - Different types of scales
Ampullae of Lorenzini
Hand section of olfactory organs
Nerve fibre
Blood film
Eggs.

Books recommended for Special Papers(Ichthyology & Fisheries)

Lagler Ichthyology
Norma History of fishes.

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Berg, L.S.	Classification of fishes.
Francis Day	Fishes of India vol. I & II
K.C. Jayaram	The freshwater fishes of India, ZSI Calcutta.
P.K. Talwar	Commercial Marine fishes of India, ZSI Calcutta.
K.S. Misra	Fauna of India, Vol. I, II, III. Rec. of Indian Museum.
V.G. Jhingeran	Fish and Fisheries on India.
Parihar	Fish and Fisheries.
Chandy ,M.	Fish and fisheries. NBT, New Delhi
	Wealth of India Vol. III.
C.V.Kurian and V.O.Sebestian	Prawns and Prawn Fisheries of India, Hindustan Publishing House, Ndelhi
C.L.Chunder	Breeding of Indian Major Carps, Rashtriya Art Printers, Agra
Lal	Nets and gears
Khanna S.S.	Fishes
Grover	Fishes-
C.B.L. Srivastava	Biology of Fishes
Santosh Kumar	Anatomy and physiology of Fishes, Vikas Publication, N.Delhi

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Special paper - (IV B) - Entomology

Paper - III Morphology, anatomy, physiology, ecology and ebryology of insectd.

Note: Attempt four questions in all; each question carries equal marks.

1. Morphology of head thorax and abdomen, structure of the digestive, respirator, circulator, excretory, nervous receptor organs including second and light producing organs and reproductive system.
2. Physiology of the digestive, respirators, circulatory, excretory, nervous receptors organs including sound and light producing organs.
3. Metamorphosis, role of hormones in development.

Paper - V - (B) Insect taxonomy, economic entomology, and social insects.

Note: Attempt four questions in all; each question carries equal marks.

(1) **Taxonomy :** Detailed knowledge of the following orders and particularly of the families mentioned below -

1. Thynanure 2. Collembola 3. Ortboptera 4. Blatteria 5. Phasmida 6. Mantoidea 7. Dermaplera 8. Isopetra 9. Embiopetr 10. Corredenia 11. Mallphage 12. Anopleura 13. Ephemerida 14. Onnats 15. Thysanoptera 16. Neruoptera 17. Lecoptera. 18. Heteroptera - Pentotomidae, Coredae, Lygaeidae Hydrumetridae, Beostomatidae. 19.Homopters - Fulgorisde, Oicadidae Cercopidae, Jassidate, Altyrodae, Aphidiae. 20. Coleptera - Dytisciae, Lampyridae, Cantharidae, Dermem,ade, Coccibellate, Scarwbacidae, Cerrmbycidae, Curculionidae. 21. Lopidoptera

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Pyralidiate, Necurti, Spobgidae, Geometridae, Bombacidae, Saturnidae, Papilionadar, Nymphaldae. 22,. Strepsiptgera 23. Hymenoptera - Teuthrednae, Evanidae Ichne, umoidae, Chalici iade, Formicidae, Vespodne, Ecmeniade, Aniade. 24. Dipters - Mycroplidae, Tipulidae, Psychodiae, Culcidae, Chtrononade, Asilidae, Syphidae, Muciade, Tuchiniade Hippobosedae 25. Siphoupera

(2) Economic entomology economci importance of the weevil, locust honey bee, lac insect,pests of stored grains, cotton paddy, super cape, cattle, men, forest plants and frutis their life histerier, Nutrit of dusage and various types of control measures employed with special emphasis on insecticides.

(3) Social insects - their organization adaptations and behaviour.

(4) Soil insects and plant protection.

Books recommended.

Evig , D..: College Entomology.

Imm. A.D. : Text book of Entomology (9th ed. revited by Richard an Davis.

Icocot, A.D. : Recent Advances in Entomology.

Packward, A.S.: Text Book of Entomology.

Practical

Note : The practical examination on second day will also extend for five hours. Each student will maintain a record of the excursion and submit it at the time of this examination alongwith his/her practical record, collection and preparation.

The division of marks is as follows:

1.	Major dissection	15 marks.
2.	Minor dissection	05 marks
3.	Ten spots for identification and comments	20 marks.

4.	Identification of two legal insects upto species leve	10 marks.
5.	One biostatistical problem	10 marks.
6.	Excursion report	20 marks.
7.	Viva voce test	10 marks.
8.	Record, collection, and preparations.	10 marks.
	TOTAL	100 marks.

Syllabus for M.Sc. (Final) Zoology (Entomology special paper) practical examination.

Major dissection:

Expose any one of the following systems and associated parts of any of the insects,

Nervous system, Alimentary canal, Reproductive system and Respiratory system of Grasshopper, Dysdercus (Red cotton bug), Danus (Plain tiger butter fly), Acherontia (Hawk moth), Musca (Housefly_, Apis (Honey bee), Vespa (Wasp) and Mylabris (Blister beetle).

Ginor dissection:

Tentorium, Tympanum of Grasshopper, Spiracle of Grasshopper, Endocrine system of the Cockroach, Heart and blood vessels of Cockroach, Johnston's organ of Male mosquito, aristate antenna and modified hind wing (Haltere) f housefly, Sting apparatus of Honey bee and Wasp, Genitalia of Male and Female.

Study of the following prepared slides:

Type of Antenae, Mouth parts, Legs, Wings, Wign coupling apparatus, Eggs and Overioles. W.H. of Lepisma, Springtails, Pediculus, Cimex, Aphid, Kenopsylla, Bird louse, Culex Pupe and Female, Anopheles male and female, kedes male and female, Phrip, Larva of Culex and Anopheles, Pupa of Culex

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and Anopheles. T.S. Gizzard and Porventriculus of Cockroach, T.S. of fore gut, mid gut and hind gut alongwith cloaca, T.S. of Filter chamber, T.S. of Rectum, T.S. of Compound eye, T.S. of Flight muscle fibres, T.S. of Testis, Ovary, T.S. through an early embryo, T.S. of abdominal ganglia, L.S. of Spiracle alongwith trachea, L.S. of Brain, L.S. of the fore gut of Cockroach, MV.S. of the heaf of a Cicada, Gills of aquatic insects.

Study of the following museum specimens:

Mantis, Phyllium, Stick insect, Earwig, Queen termite, Belostoma, Cicada Male & Female , Nepa, Rhinoceros beetle, Types of Larvae and Pupae, Life History of Silk worm, Sand fly, Butterfly, Lac insect, Honey bee.

Study of the Specimens selected from the Orders of insects as per theory course for the purpose of identification.

Record of the exercises on growth and development of insects with the help of following biostatistical calculations; Dyar's law, Chi-square test, Growth index and Howe's index values, Critical difference, Standard error, Standard deviation, Transformed and Angular transformed values.

Histological preparations of the Grasshopper viscera exposed to easily available insecticides.

At least one Life History of a crop pest is to be included in the collection.

Books recommended for special paper

D.P. Tombhare: Insect, morphology, and physiology, S.Chand & Co.

H.Bursell: Insect physiology, Academic Press, NY

A.Kumar and P.M.Nigam - Economic and applied entomology, Emkay Publishers, Delhi - 51

Nigam, P.M. and A.Kumar ü Agricultural entomology, do.

Kumar, A and P.N, Nigam- Crop pests of India do

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Special Paper - IV (C) - Parasitology

IV. General Parasitology

Note: Attempt four questions in all; each question carries equal marks.

(1) Morphology and systematics (including ultrastructure) of protozoans, trematodes, cestodes and nematodes in relation to man & domestic animals.

(2) Life cycle of the following :

Entameoba historlytica, Trypanosoma, Leishmania, Schistosoma, Paragonimus westermani, Dicrocoelium dendriticum, Echinococcus granulosus, Diphyllobothrium latum, Dipylidium canimu, Hymenolepis nana, Wuchereria bancrofti, Brugia malayi, Dracunculus medinensis, Trichinella, spiralis, Strongyloides stercoralis.

(3) Different types of larvae of trematodes cestodes and nematodes.

(4) General account of parasitism, evolution and parasitic adaptation.

(5) Arthopods as vectors.

Paper V (C) - Applied Parasitology

Note: Attempt four questions in all; each question carries equal marks.

1. Causes, symptoms, diagnosis, treatment and prevention of important prasitic protozona,s trematodes, ceastdes & nematodes of man & domestic animals.
2. Physiology of nutrition, excretion and respiration of parasites.
3. Ecology of parasities.

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