

Suggested Laboratory Exercises

1. Comparative study of algal genera with reference to the classes, mentioned in theory.
2. Comparative study of fungal genera with reference to the classes mentioned in theory.
3. Fungal diseases : White rust of crucifers, downy mildew of pearl millet, green ear disease of bajra, powdery mildew, rust of wheat and sorghum, Tikka leaf spot disease of groundnut. Red rot of sugarcane.
4. Section cutting of fungal diseased specimens and preparation of lactophenol mounts.
5. Comparative study of morphology, anatomy and reproductive structures of representative pteridophytes available and mentioned in theory.

Paper VI. Biology of Seed Plants

Unit-I

Phanerogams, the seed bearing plants : General characteristics and types.

Gymnosperms : General characters, ontogeny and structure of ovule; the ovule and megasporogenesis, female gametophyte; pollination, formation of pollen tubes and fertilization; embryogeny and maturation of seed.

The living cycads : Distribution: vegetative organography and anatomy: reproductive cycle, sporophytes and sporangia gametophytes, fertilization, embryogeny and seed development.

The coniferales : General organography and anatomy; foliage leaves. Strobilli and sporangia: reproductive cycle, sporogenesis, gametophytes, pollination, fertilization and embryogeny.

Unit-II

The Gnetales : Habit and distribution : vegetative organography and anatomy; reproductive cycle—the strobilli, sporogenesis, male and female gametophytes, pollination, fertilization and embryogeny.

Angiosperms : Organography and anatomy, leaf morphology, histology and venation : vegetative to reproductive development.

Alternatives for reproduction : Vegetative and sexual reproduction; transition from vegetative to reproductive development.

Flower : Evolution; concept of flower as a modified determinate shoot, genetic control of floral organs, functions of flower.

Unit-III

Structure of anther : Microsporogenesis: formation of pollen grains (male gametophyte) pollen germination. pollen tube growth.

Structure of pistil : Ovules : megasporogenesis, development of embryo sac (female gametophyte).

Mechanisms and agencies of pollination : Pollen-stigma interaction : self-incompatibility; double fertilization; apomixis.

Seed and fruit : Development of endosperm and embryo in monocotyledons and dicotyledons: storage of reserve materials and desiccation in seeds; dormancy and seed germination: fruit maturation: ripening and dispersal.

Suggested Readings

1. Cronquist, A. 1968. The Evolution and Classification of Flowering Plants, Thomas Nelson (Printers) Ltd., London & Edinburgh.
2. Delevoryas, Th. 1965. Plant Diversification, Modern Biology Series, Halt Rinehart & Winston, New York.
3. Foster, A.S. and Gifford, A.E.M., Jr. 1967. Comparative Morphology of Vascular Plants, Vakils, Pefer & Simons Pvt. Ltd.
4. Sporne, K.R. 1977. The Morphology of Angiosperms. B.I. Publication, Mumbai.
5. Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms, 4th revised and enlarged edition. Vikas Publishing House, Delhi.
6. Johri, B.M. 1984. Embryology of Angiosperms, Springer-Verlag, Berlin.
7. Raghava, V. 1997. Molecular Embryology of Flowering Plants, Cambridge University Press, N.Y.

Suggested Laboratory Exercises

1. Comparative anatomical structure of stem/wood of Cycadales, Coniferales, Ginkgoales, Ephedrales. Gnetales and angiosperms, from sections and macerations.
2. Comparative structure of leaf, leaf appendages, venation and stomata of gymnosperms and angiosperms.

3. Comparative structure of the male and female cones of Cycads, Conifers. Ginkgoales (wherever available) and Ephedrales and flowers of Ranales and Magnoliales.
4. Diversity in pollen grain structure among Cycads, Conifers, ephedrales and angiosperms with respect to size, exine sculpturing, germ pore number, number of constituent cells and any other feature.
5. Microsporogenesis and male gametophyte development in angiosperm through microtome sectioning and acetocarmine squash technique.
6. Pollen grain germination by hanging-drop and sitting-drop techniques in *Impatiens*, *Catharanthus roseus* (= *Vinca rosea*) or any other suitable material.
7. Diversity in the stigmatic papillae and transmitting tissue of style.
8. Comparison of mating types in species exhibiting heteromorphic self incompatibility *Hamelia patens*, *Pentas* or any other suitable material.
9. Studies on gametophytic and sporophytic self-incompatibility in *Petunia*.
10. Microdissection of embryo with suspensor at different stages of development to unravel relationship between the two.
11. Microdissection of endosperm with different types of haustoria.

Paper VII. Microbiology and Plant Pathology

Microbiology

Unit-I

1. **Discovery of Micro-organisms** : Systematic position of micro-organisms in biological world; classification of micro-organisms and characteristic features of different groups.
2. **Methods in Microbiology** : Basic principles of microscopy, micrometry, staining, sterilization methods; culture media; pure culture methods; methods for population estimation, growth determination.

3. **Ultrastructure of Micro-organisms** : Prokaryotic micro-organisms; fine structure of prokaryotic cell; eukaryotic micro-organisms; viruses—properties and classification; characteristic features of host-virus interaction; bacteriophage T4; tobacco mosaic virus, general account of mycoplasma and actinomycetes.
4. **Genetic recombination in prokaryotes** : Conjugation, transformation and transduction.
5. **Role of micro-organisms in biogeochemical cycling of nitrogen and carbon; biological N₂ fixation.**

Unit-II

6. **Industrial application of micro-organisms** : Organic acids, alcohol, food processing, milk products, antibiotics, biopesticides.

Plant Pathology

7. **General account of plant pathogens** : Historical developments; general account of diseases caused by plant pathogens.
8. **Pathogen attack and defence mechanisms** : Physical, physiological, bio-chemical and molecular aspects.
9. **Plant disease epidemiology** : Transmission and spread of plant pathogens; disease cycles, epidemics: modelling and disease forecasting.
10. **Plant disease management** : Chemical, biological; IPM systems; development of transgenics; biopesticides; plant disease clinics.

Unit-III

11. **Genetics of resistance and susceptibility** : Genes for virulence and avirulence, their application in resistance and susceptibility; induced resistance (immunization).
12. **Molecular plant pathology** : Molecular diagnosis, identification of genes and specific molecules in disease development; molecular manipulation of resistance.
13. **Application of information technology in plant pathology** : Simulation of epidemics; programmes for diagnosis; remote sensing and image analysis for ecosystem level effects; prediction of disease control decisions.

Suggested Readings

Books

1. Agrios, G.N. 1997. Plant Pathology, Academic Press, London.
2. Albajes, R.; Gullino, M.L.; van Lentem, J.C. and Elad, Y. 2000. Integrated Pest and Disease Management in Greenhouse Crops. Kluwer Academic Publishers.
3. Bridge, P. *et al.* 1998. Molecular Variability of Fungal Pathogens. CAB International, UK.
4. Bridge, P. *et al.* 1999. Application of PCR in Mycology, CAB International, UK.
5. Bridge, P.; Moore, D.R. and Scott, P.R. 1998. Information Technology, Plant Pathology and Biodiversity, CAB International UK.
6. Persley, G.J. 1996. Biotechnologic and Integrated Pest Management, CAB International, UK.
7. Skeritt, J.H. and Apples, R. 1995. New Diagnostics in Crop Sciences, CAB International, UK.

Suggested Laboratory Exercises (Microbiology)

1. Calibration of microscope; determination of dimensions of micro-organisms (suggested model organisms; yeast, lactobacilli, cyanobacteria).
2. Cultivation media for autotrophic and heterotrophic micro-organisms (cleaning of glasswares, mineral media, complex media, solid media, sterilization) (based on topic 3).
3. Isolation of micro-organisms; streaking on agar plates/pour plate method, isolation of clones, preservation (based on topics 2 and 3).
4. Preparation of Winogradsky column using pond bottom mud, observations on temporal sequence of appearance of microbes. (Visual appearance, microscopic observations) (based on topic 7).
5. Observation of virus infected plants (symptoms) (based on topic 5).

6. Fermentation by yeast (inverted tube method, use of different substrates, e.g. glucose, fructose, cane sugar, starch) (based on topic 8).

Suggested Readings (for laboratory exercises)

1. Fulkui, K and Nakayama, S. 1996. Plant Chromosomes : Laboratory Methods. CRC Press, Boca Raton, Florida.
2. Sharma, A.K. and Sharma, A. 1999. Plant Chromosomes : Analysis, Manipulation and Engineering, Harwood Academic Publishers, Australia.
3. Eklund, C. and Lankford, C.W.E. 1967. Laboratory Manual for General Microbiology, Prentice-Hall, Inc., Englewood Cliffs, N.J.
4. Gunasekaran, P. 1995. Laboratory Manual in Microbiology, New Age Internatinoal Pvt.Ltd.
5. Pawsey, R.K. 1974. Techniques with Bacteria—A Guidebook for Teachers. Hutchinson Educational.
6. Pelezor, M.J. and Chan, E.C.S. 1972. Laboratory Exercises in Microbiology. McGraw Hill Book Co.
7. Meynell, E. and Meynell, G.G. 1970. Theory and Practice in Experimental Bacteriology. University Press, Cambridge.
8. Wistrieck, G.A. and Leehtman, M.D. 1973. Laboratory Exercises in Microbiology, Glencoose Press, New York, Beverly Hills, Collier Macmillan Publishers, London.

Suggested Laboratory Exercises (Plant Pathology)

1. Study of important plant pathogens (symptoms and host parasite relationship) as per syllabus.
2. Isolation and culture of plant pathogens (e.g.; Colletotrichum, Fusarium Alternaria) and establishment of Koch's Postulates and their pathogenicity.
3. Effect of pathogens on physiology of a host.
4. Isolation of cellulose from diseased plants.
5. Isolation of pectolytic enzymes from diseased plants.
6. Study on antagonism between isolated antagonists and plant pathogens and test of biological control. Demonstration of antibiosis using a bacterial culture and known antibiotics.

7. Demonstration of the assay of prohibitions (Phytoalexins).
8. Demonstration of biopesticides (essential oils—neem, turmeric and garlic) against some pathogens.

Suggested Readings (for laboratory exercises)

Books

1. Aneja, K.R. 1993. Experiments in Microbiology, Plant Pathology and Tissue Culture. Wishwa Publication, New Delhi.
2. Mahadevan, A. and Sridhar, R. 1986. Methods in Physiological Plant Pathology. Sivakami Publications, Channai.
3. Schaad, N.W. 1988. Plant Pathogenic Bacteria : Laboratory Guide for Identification of Plant Pathogenic Bacteria.

Journals/Series

Methods in Microbiology.

Methods in Enzymology.

Methods in Biochemistry.

Paper-VIII : Genetics and Plant Breeding

Genetics

Unit-I

Mendel's experiments and principles of inheritance : Backcross and test cross; gene interactions and modified dihybrid ratios-complementary, supplementary, duplicate and epistatic factors.

Multiple allelism : Multiple alleles in *Drosophila* (eye colour), man (blood groups and plants (self incompatibility).

Quantitative genetics : Quantitative traits and quantitative genetics; multiple factor hypothesis; descriptive statistics.

Linkage and recombination : Coupling and repulsion phases; two and three point test crosses with their significance in chromosome mapping; interference and co-efficient of coincidence.

Sex chromosomes in *Drosophila*, Man and *Melandrium* : Balance concept of sex determination in *Drosophila*; mechanisms of sex determination; sex linked inheritance in *Drosophila* and man; sex limited characters.

Unit-II

Maternal influence on heritance : Shell coiling in snails and Kappa particles in Paramecium; cytoplasmic inheritance in yeast (mitochondria) and *Mirabilis jalapa* (plastids).

Alterations in the genetic make-up changes at genetic level : Spontaneous and induced mutations; mutagens—types and mode of action; transitions, transversions and frame-shift mutations; detection of mutations.

Alterations in the genetic make-up changes in chromosome structure : Origin, types and effects of duplications, deletions, inversions and translocations; meiosis in structural heterozygotes.

Origin, types and effects of auto and allopolyploidy; origin and meiosis in nullisomics, monosomics and trisomics.

Unit-III**Plant Breeding**

Types of plant reproduction : Vegetative, sexual and apomixis; their effect on generating and fixing genotypic variation.

Methods of plant improvement : Pure line and mass selection; hybridization in self and cross pollinated crops; introduction and acclimatization; hybrid vigour.

Mutations and polyploidy as methods of plant improvement.

Suggested Readings

1. Atherly A.G., Girton, J.R. and McDonald, 1999. *The Science of Genetic*. Saunders College Publishing Co. Fortworth, USA.
2. Gardener, J.; Simmons, H.J. and Snusted, D.P. 1991. *Principles of Genetics* (8th Edition). John Wiley & Sons, New York.
3. Gupta, P.K. 1994. *Genetics*. Rastogi Publications, Meerut.
4. Gupta, P.K. 1995. *Cytogenetics*, Rastogi Publications, Meerut.
5. Harti, D.L. and Jones, E.W. 1998. *Genetics : Principles and Analysis* (4th Edition). Jones & Bartlett Publishers, Massachusetts, USA.

6. Poehlmann, J.M. and Sleeper, D.R. 1995. Breeding Field Crops. Panima Publishing House, New Delhi.

Suggested Laboratory Exercises

1. Determination of chromosome count from dividing pollen mother cells, root tips and pollen grains.
2. Preparation of karyotypes from dividing root tip cells and pollen grains.
3. Determination of intraspecific variation in chromosome number from locally available taxa.
4. Study of sex chromosomes and their behaviour during meiosis from grasshopper and any appropriate dioecious plant (*e.g.*, *Coccinia*).
5. Detection of anomalies in chromosome pairing and disjunction caused by mutant genes and structural alterations of chromosomes.
6. Preparation of chromosome maps from 3-point test cross data.
7. Identification of mutant phenotypes in *Drosophila* and *Arabidopsis* stocks maintained by the Department.
8. Correlation of floral structure with pollination system (*e.g.*, *Salvia*, *Sesamum*, pea, lathyrus, wheat, rice, maize, ricinus).
9. Field exploration for detection of male sterile plants and estimation of their pollen fertility in locally grown crop plants *e.g.*, sorghum, tomato and linum.
10. Estimation of pollen ovule ratio and its bearing on pollination system.
11. Emasculation and bagging of flowers of Brassicaceae, Poaceae, Papilionaceae, Malvaceae and Linaceae, pollinating them manually and estimating fruit and seed set.

5. MATHEMATICS

Teaching : 3 hours per week per Theory paper.

2 Hours per week per Batch for Practical

(20 candidates in each batch)

Examination :

Min. Pass Marks-160

Max. Marks-400

Scheme :

		Duration	Max. Marks	Min. Pass Marks
Paper-V	Real Analysis and Metric Space	3 hrs.	100	40
Paper-VI	Differential Equations	3 hrs.	100	40
Paper-VII	Numerical Analysis	Theory : 2 $\frac{1}{2}$ hrs.	68	27
	Vector Calculus	Practical : 2 hrs.	32	13
Paper-VIII	Operation Research	3 hrs.	100	40

Note :

1. Papers V, VI and VIII will be divided into FIVE Units. Two questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each Unit. All question carry equal marks.
2. Paper VII is divided into FOUR Units. TWO questions will be set from each Unit. Candidates are required to attempt FOUR questions in all taking ONE question from each Unit. All questions carry equal marks.
3. Common paper will be set for both the Faculties of Social Science and Science. However. the marks obtained by the candidate in the case of Faculty of Social Science will be converted according to the ratio of the maximum marks of the papers in the two Faculties.
4. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by on University and internal examiner will be appointed by the

Principal in consultation with Local head, Department of Mathematics in the college.

5. An Internal/external examiner can conduct Practical Examination not more than 100 (Hundred) candidates (20 Candidates in one batch).
6. Each candidate has to pass in Theory and Practical examination separately.

Paper-V : Real Analysis and Metric Space

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours Max. Marks : 100

Note : This paper is divided into FIVE Units. Two questions will be set from each unit. Candidates are required to attempt FIVE questions in all taking ONE question from each unit. All questions carry equal marks.

UNIT-1

Real numbers as complete ordered field, Limit point, Bolzano-Weierstrass theorem. Closed and Open sets. Union and Intersection of such sets. Concept of compactness. Heine-Borel theorem. Connected sets.

Real sequences—Limit and Convergence of a sequence. Monotonic sequences.

UNIT-2

Cauchy's sequences. Subsequences, Cauchy's general principle of convergence. Properties of continuous functions on closed intervals. Properties of derivable functions. Darboux's and Rolle's theorem.

UNIT-3

Notion of limit and continuity for functions of two variables.

Riemann integration—Lower and Upper Riemann integrals, Riemann integrability, Mean value theorem of integral calculus. Fundamental theorem of integral calculus.

UNIT-4

Sequence and series of functions—Pointwise and Uniform convergence, Cauchy's criterion, Weierstrass M-test, Abel's test, Dirichlet's test for uniform convergence of series of functions. Uniform

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convergence and Continuity of series of functions, Term by term differentiation and integration.

Metric space—Definition and examples, Open and Closed sets, Interior and Closure of a set. Limit point of a set.

UNIT-5

Subspace of a metric space, Product space, Continuous mappings, Sequence in a metric space. Cauchy sequence, Complete metric space, Baire's theorem, Compact sets and Compact spaces, Connected metric spaces.

Paper-VI : Differential Equations

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours Max. Marks : 100

Note : This paper is divided into FIVE Units. Two questions will be set from each unit. Candidates are required to attempt FIVE questions in all taking ONE question from each unit. All questions carry equal marks.

UNIT-1

Degree and order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations and equations reducible to homogeneous form. Linear equations and equations reducible to linear form. Exact differential equations and equations which can be made exact.

UNIT-2

First order but higher degree differential equations solvable for x , y and p . Clairaut's form and singular solutions with Extraneous Loci. Linear differential equations with constant coefficients, Complimentary function and Particular integral.

UNIT-3

Homogeneous linear differential equations. Simultaneous differential equations. Exact linear differential equations of n th order. Existence and uniqueness theorem.

UNIT-4

Linear differential equations of second order. Linear independence of solutions. Solution by transformation of the equation by changing

the dependent variable/the independent variable. Factorization of operators, Method of variation of parameters, Methods of undetermined coefficients.

UNIT-5

Partial differential equations of the first order. Lagrange's linear equation. Charpit's general method of solution. Homogeneous and non-homogeneous linear partial differential equations with constant coefficients. Equations reducible to equations with constant coefficients.

Paper-VII : Numerical Analysis and Vector Calculus

Teaching : 3 Hours per Week

Duration of Examination : 2¹/₂ Hours Max. Marks : 68

Note : (i) This paper is divided into FOUR Units. TWO questions will be set from each Unit. Candidates are required to attempt. FOUR questions in all taking ONE questions from each Unit. All questions carry equal marks.

(ii) Non-Programmable Scientific Calculators are allowed.

UNIT-1

Differences. Relation between differences and derivatives. Differences of a polynomial. Newton's formulae for forward and backward interpolation. Divided differences. Newton's divided difference. Interpolation formula. Lagrange's interpolation formula.

UNIT-2

Central differences. Gauss's Stirling's and Bessel's interpolation formulae. Numerical Differentiation. Derivatives from interpolation formulae. Numerical integration. Newton-Cote's formula. Trapezoidal rule, Simpson's one-third, Simpson's three-eighth and Gauss's quadrature formulae.

UNIT-3

Numerical solution of algebraic and transcendental equations. Bisection method. Regula-Falsi method. Method of iteration, Newton-Raphson method. Gauss elimination and Iterative methods (Jacobi and Gauss Seidal) for solving system of linear algebraic simultaneous equations. Solutions of ordinary differential equations of first order with initial and boundary conditions using Picard's and modified Euler's method.

UNIT-4

Scalar point function. Vector point function. Differentiation and integration of vector point functions. Directional derivative. Differential operators. Gradient, Divergence and Curl. Theorems of Gauss, Green, Stokes (without proof) and problems based on these theorems.

PRACTICAL

Teaching : 2 Hours per Week per Batch
(20 Candidates in each Batch)

Examination :

Scheme

Max. Marks **32**

Min. Pass **13**

Distribution of Marks :

Two Practicals one from each group		
10 Marks each	=	20 Marks
Practical Record	=	06 Marks
Viva-voce	=	06 Marks
Total Marks	=	32 Marks

Group A : Numerical integration using Trapezoidal and Simpson's rules. Numerical solution of Algebraic and Transcendental equations using (i) iteration method (ii) Newton's—Raphson Method and (iii) Regula-falsi method.

Group B : Numerical solution of the system of linear equations by Jacobi and Gauss-Seidel methods. Solution of linear differential equations of first order and first degree with initial and boundary conditions using Picard's and modified Euler's method.

Note :

1. Problems will be solved by using Scientific Calculators (non-Programmable)
2. Candidates must know about all functions and operations of Scientific Calculator.
3. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
4. Each Candidate has to pass Practical and Theory examinations separately.

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Paper-VIII : Operation Research

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours Max. Marks : 100

Note : This paper is divided into FIVE Units. Two questions will be set from each unit. Candidates are required to attempt FIVE questions in all taking ONE question from each unit. All questions carry equal marks.

UNIT-1

Assignment models—Mathematical formulation. Hungarian method, Variations of the assignment problem. Travelling-salesman problem.

Transportation models—Mathematical formulation, Initial basic feasible solution. Transportation algorithm for minimization problem, Degeneracy and unbalanced transportation problems.

UNIT-2

Theory of Games—Introduction. Basic definitions, Minimax (Maximin) criterion and Optimal strategy, Saddle point, Minimax-Maximin principle for mixed strategy games. Fundamental theorem of Game theory. Two-by-two games without saddle point. Arithmetic method for 2×2 games. Graphical method for 2×2 games.

UNIT-3

Inventory Models—Definition, Types of inventory models. Classification of inventory models. Economic ordering quantity (EOQ). EOQ models without shortage. EOQ models with shortage. EOQ models with constraints.

UNIT-4

Probability Theory—Probability distributions of a random variable, Standard deviation, Variance, Mathematical expectation, Binomial, Poisson and Normal distributions.

UNIT-5

Queueing Theory—Introduction, Probability distributions in queueing systems. Models-Erlang model, general Erlang model, Model III (M/M/1) : (N/FCFS).

6. GEOGRAPHY (HONS.)

Scheme :

Min. Pass Marks : 160 (40%) **Max. Marks : 400**

Papers	Duration	Max. Marks
Paper-V Introduction to Political Geography	3 hrs.	80
Paper-VI Geography of Rajasthan	3 hrs.	80
Paper-VII Biogeography	3 hrs.	80
Paper-VIII Statistical Methods in Geography	3 hrs.	80
Practical		80

Note :

- Students are permitted to use the stencils, simple calculator and Log Tables, where needed in the examinations.
- Q.1. in all papers will be compulsory and will cover the entire course contents of the paper.
One question (Q.No. 1) of 20% marks of the total marks be set in two parts.
(a) Q. on map (to be supplied) of 10% marks.
(b) Q. objective type (Multiple choice and very short answer) of 10% marks.
- Nine questions will be set with three questions from each section.
- The candidates will attempt five questions selecting at least one from each section.
- For practical paper each student will attend a socio-economic survey camp and write a report. The report should be supported by maps and diagrams.
- The students will have to pass separately in theory and practical.
- Annual Theory examination will be of 3 hours duration.

Paper-V : Introduction to Political Geography**Section-A**

Nature, scope and significance of Political Geography, Political Geography and Geopolitics.

Approaches to the study of Political Geography : Morphological and functional.

Role of Physical, demographic, economic and socio-cultural factors in Political Geography.

Section-B

State as a politico-territorial Phenomenon. The changing value of

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location, size and shape in the Political Geography of states.

Organisation of Government over the national territory-unitary and federal.

Boundaries and frontiers : function and classification of international, federal.

Section-C

Global Strategic Views : The views of Mackinder, Spykman, de Seversky, Mahan and the Unified Field Theory of S.B. Jones. Under-development and international policies, the North-South dialogue and new international economic order.

International tensions—identification of tension areas and factors contributing to tension in different areas with special reference to West Asia and the Indian Ocean Region. Regionalism in international relations.

Recommended Books :

1. Dikshit, R.D. : Political Geography : A Contemporary Perspective. Tata McGraw-Hill Publishing, Co. New Delhi.
2. Bhagwati, J.N. (ed.) : New International Economic Order—The North-South Debate, M.I. T. Press, London, 1976.
3. Prescott, J.R.V. : Political Geography, Methuen & Co. London, 1972.
4. Taylor, Peter : Political Geography, Longman, London.
5. Short, J.R. : An Introduction to Political Geography. Routledge & Kegan Paul, London, 1982.

Reference Books :

1. Taylor, Peter : Political Geography : Recent Advances and Future Directions. Barnes and Noble Books, Totowa, J.N., 1984.
2. De Blij, Harms, J. : Systematic Political Geography, John Wiley & Sons Inc. New York, Latest Edition.
3. Muir, R. : Modern Political Geography, McMillan, London, 1981.

Paper-VI : Geography of Rajasthan

Section-A

Location of Rajasthan and its position in India. Physical features and topography, geology, soil, drainage, vegetation, climate and climatic regions.

Section-B

Agriculture—major crops, problems of agriculture, agricultural typology, wasteland and its problems. Agro climate regions. Irrigation—Sources of irrigation, major irrigation projects—Indira Gandhi Canal and the Chambal Command Area, Industries—Location of industries, major industries, small scale industries, minerals and their utilization.

Section-C

Population – Number, growth, distribution and density.

Settlement Patterns – Types of settlements, building materials and house types in Rajasthan.

Regional Geography of Rajasthan : Geographical Regions— Desert region, East Rajasthan upland, Indira Gandhi Canal Command Region. The Chambal Command Area, Haudoti Region, Mewar Region, The Aravalli Region.

Recommended Books :

1. Mishra, V.C. (1976) : Geography of Rajasthan. National Books Trust, New Delhi.
2. Chauhan, T.S. (1986) : Agricultural Geography of Rajasthan.
3. Dhabaria, S.S. (1988) : Desert Spread and Desertification, Environmentalist, Jaipur.
4. Dhabara S.S. (1988) : Ecocrises in the Aravalli Hill Region, Environmentalist, Jaipur.
5. Bhalla, L.R. (1989) : Rajasthan Ka Bhugol, Kuldeep Publications, Ajmer, Second Edition.
6. Sharma B.I., (1984) : Agricultural Typology of Rajasthan.

Paper-VII : Introduction to Bio-Geography**Section-A**

Definition, scope and significance of Bio-Geography. Basic ecological principles : Bio-energy cycle in the terrestrial ecosystem and energy budget of the earth : Trophic levels and food chain : Darwin's theory of Evolution, concepts of Biome, Ecotone and Community.

Section-B

Origin of Fauna and flora : Geographical distribution, major genecentres domestication of plants and animals and their dispersal. Distribution of plant life on the earth and its relation to soil types, climates and human practices.

Geographical distribution of animal life on the earth and its relations to soil, vegetation types, climates and human practices.

Section-C

Problems of extinction of some major plant and animal life : Habitat decay and their conservation. Process of desertification—Its consequences and its management principles.

Industrial affluent and its effect on fresh water biology and marine biology management practice (Special reference to India). Study of two ecological regions of India in relation to their plant and animal life, their interrelations, problems, conservation and management measures.

Recommended Books :

1. Robinson, H : Biogeography, ELBS, McDonald and Evans. London. 1982.

2. Simmons, I.G. : Biogeographical Processes, George Allen and Unwin, London.
3. Berry, C. : Biogeography-An Ecological and Evolutionary Approach, Cox Balckweel, Oxford, 1977.

Reference Books :

1. Seddon B : Biogeography, Duckworth, London. 1971.
2. Martin, C : Plant Geography, Mathuen, 1972.
3. Phillip, J. Zoo Geography : The Geographical Distribtuion of Animals. John Wiley, New York, 1957.

Paper-VIII : Statistical Methods in Geography

Section-A

Significance of the statistical techniques in geographic studies.
Data and its problems, Analysis of data.
Frequency distributions, Characteristics of frequency distributioin :
number of classes : class-interval.
Precentage frequencies : cummulative frequencies.
Types of frequency graphs histogram : frequency polygon :
frequency curve.

Section-B

Measurers of central tendency : means, median, mode, arithmetic mean and geometric mean.
Measure of variations of dispersion : crude range.
Quartile deviation : quartiles for grouped and upgrouped data:
median and the quatile; standard deviation : Normal curve : Relative variation; measures of Skewness : Kurtosis.

Section-C

Theoy of probability—Basic Principles : axioms probability : Probability distribution. Theory of sampling : types of sampling : random and systematic sampling : problems of application of sampling methods of geography.

Reference Books :

1. Aslam, Mahmood—Statistical Methods in Geographical Studies. Rajesh Publications, Delhi 1977.
2. Duncan, O.D. *et al.*—Statistical Geography, (Problems in Analysing Areal Data), Free Press of Blenco, New York, 1961.
3. Gregory, S.—Statistical Methods and the Geographer. Longmans London, 1963.
4. King, L.J.—Statistical Analysis in Geography. Prentice Hall, Englewood Clifs, NJ.
5. Lewis. Peter-Maps and Statistics, Methuen & Co. Ltd. London. 1977.

6. Monkhouse, F.J. and H.R. Wilkinson—Maps and Diagrams, Methuen & Co. London, 1967.
7. Norchife—Inferential Statistics for Geographers, B.I. Publications, Chennai, 1985.
8. Singh, R.L.—Elements of Practical Geography, Kalyani Publishers, New Delhi, 1979.
9. Yeates, Mauric M.—An Introduction to Qauntitative Analysis in Economic Geography, McGraw-Hill New York, 1968.

Geography Practical

Scheme :

Min. Pass Marks : 32

Max. Marks : 80

Distribution of marks for purpose of examination :

	Marks	Time
1. Written Test	30	3 hrs.
2. Field of Survey and viva	15 (10+5)	2½ hrs.
3. Socio-economic survey camp report and viva	15 (10+5)	2½ hrs.
4. Record and viva	20 (12+8)	

Course Contents : Representation of population, Economic and Commercial data on maps and diagrams—Point symbols (dots, circles, spheres), Live and area symbols (Isopleths and choropleth. use of mean. Median, quartile and standard deviation in mapping use of line and bar graphs for representing trends in population, agricultural, industrial and transport data.

Plane table survey (intersection, traverse, resectioning, use of clinometer, meaning and interpretation of remote sensing.

Social-economic survey of a town/village within the state of Rajasthan. The report will be submitted at the time of practical examination. The expenditure on the T.A./D.A of the teachers and 50 per cent of the transport charges on the students shall be meet out from the University/College fund.

Reference Books :

1. Monk House, F.J. : Maps and Diagrams, Methuen & Co., London, Latest Edition.
2. Robinson, A.H. and others : Elements of Cartography, John Wily and Sons, New York. Latest Edition.
3. Singh, R.L. and Dutt, P.K. : Elements of Practical Geography, Students Friends, Allahabad.
4. Mishra, R.P. Ramesh A. : Fundamentals of Cartography, Macmillan, New Delhi, 1986.
5. Mahmood, Aslam : Statistical Techniques in Geographical Studies, Rajesh Publishers, New Delhi.

24-A

14. PSYCHOLOGY (HONS.) Pt II

Scheme :

Four Theory Papers	Duration	Max. Marks	Min. Pass Marks
Paper-V	3 hrs.	75	
Paper-VI	3 hrs.	75	120
Paper-VII	3 hrs.	75	
Paper-VIII	3 hrs.	75	
Practicals		100	40

Note: : There will be 4 theory papers in subject Psychology in BA Hons Part II. There will be common paper for Arts and Science Questions No. 1 will be compulsory and will cover the entire course contents of the paper. Questions I will contain two parts A & B. A part of I question will contain 20 questions of multiple choice. Each question will be of 3/4 mark. Thus A part will be of 15 marks. B part will contain 10 questions to be answered in the limit of 20 words. Each question of B part will be of 1½ marks. Thus B part will be of 15 marks. Separate question paper for this objective type will be provided to each student and answers will be given in this question paper only in the space provided for this purpose in the objective type question paper. Candidates will be given one hour to attempt this first compulsory question out of three hours in total time allotted for this paper.

In the second part of the question paper, three questions of essay type will be attempted selecting at least one from each section. Each question will be of 15 marks. This objective type question will be compulsory to attempt in all four theory papers.

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

Paper-~~V~~ Systems of Psychology

Section-A

1. **Psychology as a Science: Origin, Present Status, Introduction to Schools of Psychology.**
2. **Beginnings of Scientific Psychology: Wundt, Webar, Fechner, Helmholtz.**
3. **Structuralism**

Section-B

4. **Functionalism**
5. **Behaviourism**
6. **Gestalt Psychology**

Section-C

7. **Freudian Psychoanalysis**
8. **Neo-Freudians: Horney, Fromm and Sullivan**
9. **Dynamic Psychology: Woodworth and McDougal**

Reference Books:

1. Hergenhahr, B.R. (2001) An Introduction to the history (4th edition), New Delhi: Cengage Learning
2. Leahey T.H. (2006) History of Psychology: Main currents in psychological thoughts, New Delhi: Pearson Education.
3. Shultz D.P. (2003). History of psychology (4th Edition), New Delhi: Pearson Education
4. Singh, A.K. (1997), The Comprehensive history of psychology. New Delhi: Motilal Banarsi Das.

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Paper II: Social Psychology

Section-A

1. **Introduction:** History of Social Psychology, Subject Matter of Social Psychology, Social Psychology as an Applied Science, Importance of Social Psychology.
2. **Social Cognition:** Schemas, Mental Frame Work for organizing Social Information, Heuristics and Automatic Processing, Potential Sources of Errors in Social Cognition, Affect and Cognition.
3. **Social Motivation and Attraction:** Meaning, Types of Social Motivation, Theory of Achievement Motivation, Inter-personal Attraction - Its meaning, determinants and Theories.

Section-B

4. **Social Attitude:** Development of Attitudes, Functions of Attitude, Attitude Change, Measurement of Attitude.
5. **Groups and Organisations:** Basic characteristics of group structure, Norms and ideology, Performance in group and individual situation, Cooperation and Conflict, Decision making in groups.
6. **Leadership:** Attributes of leadership, Origin of leadership, Functions, Type and Theories of leadership.

Section-C

7. **Prejudice and Stereotypes:** Meaning, Nature and Origin of prejudice, stereotypes – beliefs about social groups, reasons of forming and using Stereotypes, Techniques for countering Prejudice and Stereotypes.

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8. **Public Opinion and Propaganda:** Meaning, Formation and measurement of Public Opinion, Propaganda – its Meaning, Nature and Principles, Effect of media on propaganda, propaganda as an Effective tool.
9. **Social Tension and Social Change:** Meaning, types and causes of social tensions, effect of social tensions, methods of reducing social tensions. Social change: Meaning, Characteristics and Agents of social change, Resistance to social change, Effects of social changes.

Reference Books:

1. Baron, R.A. and Byrne, D. (2010). Social psychology (11th edition), New Delhi: Person education.
2. Mohammad, S. (2009). Ucchatar samaj manovigyan. New Delhi: Motilal Banarsi Das.
3. Myers, D. (2007). Social psychology. New Delhi: Cengage learning.
4. Singh, A.K. (2009). Samaj Manovigyan ke ruprekha. New Delhi: Motilal Banarsi Das.
5. Taylor, S.E. David, L.A. and Sears, O. (2009). Social psychology (12th Edition). New Delhi: Pearson education.

Paper-VII: Counselling Psychology

Section-A

1. **Counselling: The Art and Scheme of Helping**
 - (a) Meaning, purpose and goals of counselling with special reference to India
 - (b) Professional issues, ethics, education and training of the counsellor.

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2. **Counselling Process**

- (a) Counselling relationship
- (b) Counselling interviews

Section-B

3. **Theories and Techniques of Counselling**

- (a) Psychodynamic Approach: Freudian, Neo-Freudian, Modern.
- (b) Humanistic Approach: Existential, client centered.

4. **Theories and Techniques of Counselling**

- (a) Cognitive Approach: Rational emotive, Transactional analysis.
- (b) Behavioural Approach: Operant conditioning, Behaviour modification.
- (c) Indian Contribution: Yoga and Meditation.

Section-C

5. **Counselling Applications**

Child Counselling, Family Counselling: Counselling in Schools. Career Counselling,

6. Alcohol and Drug Abuse, Group Counselling, Crisis Intervention Counselling.

Reference Books:

- 1. George, R.L. and Cristiani, T.S. (1994) Counselling Theory and Practice (IV Ed.) New Delhi: Prentice - Hall.
- 2. Gibson, R.L. and Mitchell, M.H. (2005). Introduction to Counselling and Guidance. New Delhi: Pearson education.
- 3. Gelso, C.G. and Fretz, B. (2003) Counselling Psychology; Practices, Issues and Interventions New Delhi: Cengage learning.

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4. Capuzzi's (2008). Counselling and Psychotherapy (4th Ed.). New Delhi: Pearson education.
5. Gladding, S. (2009). Counselling; A comprehensive profession. New Delhi: Pearson education.

VIII Paper-~~B~~: Biological Basis of Behaviour

Section-A

1. **Introduction:** Definition, Scope and methods of studying Biological basis of behaviour.
2. **Structure and Functions of Cells of Nervous system:** Neurons, communication within a neuron, communication between neurons.
3. **Structure and Functions of Nervous system:** Basic feature, CNS and PNS: Functions, Neurotransmitters.

Section-B

4. **Lateralization of Brain functions:** Difference between left and right hemispheres, cortical localization of language, Aphasia.
5. **Ingestive behaviour:** Physiological Regulatory mechanism, Eating, Brain mechanism in Eating disorders.
6. **Sleep and Waking:** Physiological mechanism of sleep and waking; Biological clock and sleep disorders.

Section-C

7. **Learning and Memory:** Nature of Learning, Neural mechanism of learning and memory, Disorders of Memory.

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8. **Emotion, Stress and Health: Fear, Anger, Aggression; Stress and Health; Hormones and Emotion.**
9. **Fundamental Genetics – Mendelian Genetics, Chromosomes – Structure, Cell Division:- Mitosis and Meiosis, Nature and Nurture controversy (Heredity / Environment), Inheritance of Intelligence, Mental Retardation and Psychopathology in Humans.**

Reference Books:

1. Carlson, N.R. (2007) Foundations of Physiological psychology. Delhi, Pearson Education Inc.
2. Pinel, J.P. (2007), Biopsychology. Delhi, Pearson Education Inc.
3. Levinthal, C.F. (1996): Introduction to physiological Psychology, New Delhi, Prentice Hall.

Practicals:

1. Sociometry
2. Attitude Scale
3. Value Test
4. Level of Aspiration
5. Assessment of Leadership Qualities
6. Hand withdrawal or knee-jerk conditioning
7. Pneumograph (Respiration Curve)
8. Biofeedback
9. Two Point Threshold
10. Reaction Time
11. Saving method
12. Sentence Completion Test

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