

Syllabu

बस्तर विश्वविद्यालय
जगदलपुर (धरमपुरा), जिला-बस्तर (छत्तीसगढ़)



पाठ्यक्रम

बी.एस.सी. भाग - 1 (कोड - 081)
B. Sc. Part - I (Code - 081)

परीक्षा : 2011

कुलसचिव
बस्तर विश्वविद्यालय, जगदलपुर
छत्तीसगढ़ की ओर से



अधिकृत मुद्रक एवं प्रकाशक :
गीता पब्लिकेशन
महामाईपारा, रायपुर (छत्तीसगढ़)

B. Sc. Part - I

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18. Electronics	53
19. Information Technologies	56
20. Industrial Microbiology	58
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REVISED ORDINANCE NO.21
(As per State U.G.C. Scheme)
BACHELOR OF SCIENCE

1. The Three year course has been broken up into three Parts. Part-I known as B.Sc. Part-I examination at the end of the first year, Part-II known as B.Sc. Part-II examination at the end of the second year and Part-III known as B.Sc. Part-III examination at the end of the third year.
2. A candidate who, after passing (10+2) Higher Secondary or Intermediate examination of M.P. Board of Secondary Education Bhopal or any other Examination recognised by the University or M.P. Board of Secondary Education as equivalent thereto, has attended a regular course of study in an affiliated College or in the Teaching Department of the University for one academic year shall be eligible for appearing at the B.Sc. Part-I examination.
3. A candidate who, after passing the B.Sc. Part-I examination of the University or any other examination recognised by the University as equivalent thereto, has attended a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-II examination.
4. A candidate who, after passing the B.Sc. Part-II examination of the University, has completed a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-III examination.
5. Besides regular students, subject to their compliance with this Ordinance ex-student and non-collegiate students shall be eligible for admission to the examinations as per provisions of Ordinance No. 6 relating to Examinations (General). Provided that non-collegiate candidates shall be permitted to offer only such subjects/papers as are taught to the regular student at any of the University Teaching Department or College.
6. Every candidate appearing in B.Sc. Part-I, Part-II and Part-III examination shall be examined in -
 - (i) Foundation Course :
 - (ii) Any one of the following combinations of three subjects:
 1. Physics, Chemistry & Mathematics.
 2. Chemistry, Botany & Zoology.
 3. Chemistry, Physics & Geology.
 4. Chemistry, Botany & Geology.
 5. Chemistry, Zoology & Geology.
 6. Geology, Physics & Mathematics.
 7. Chemistry, Mathematics & Geology.
 8. Chemistry, Botany & Defence Studies.
 9. Chemistry, Zoology & Defence Studies.
 10. Physics, Mathematics & Defence Studies.
 11. Chemistry, Geology & Defence Studies.
 12. Physics, Mathematics & Statistics.
 13. Physics, Chemistry & Statistics.
 14. Chemistry, Mathematics & Statistics.
 15. Chemistry, Zoology & Anthropology.
 16. Chemistry, Botany & Anthropology.
 17. Chemistry, Geology & Anthropology.
 18. Chemistry, Mathematics & Anthropology.

19. Chemistry, Anthropology & Defence Studies.
20. Geology, Mathematics & Statistics.
21. Mathematics, Defence Studies & Statistics.
22. Anthropology, Mathematics & Statistics.
23. Chemistry, Anthropology & Applied Statistics.
24. Zoology, Botany & Anthropology.
25. Physics, Mathematics & Electronics.
26. Physics, Mathematics & Computer Application/Information Technologies.
27. Chemistry, Mathematics & Computer Application/Information Technologies.
28. Chemistry, Bio-Chemistry & Pharmacy.
29. Chemistry, Zoology & Fisheries.
30. Chemistry, Zoology & Agriculture.
31. Chemistry, Zoology & Sericulture.
32. Chemistry, Botany & Environmental Biology.
33. Chemistry, Botany & Microbiology.
34. Chemistry, Zoology & Microbiology.
35. Chemistry, Industrial Chemistry, Mathematics.
36. Chemistry, Industrial Chemistry, Zoology.
37. Chemistry, Biochemistry, Botany.
38. Chemistry, Biochemistry, Zoology.
39. Chemistry, Biochemistry, Microbiology.
40. Chemistry, Biotechnology, Botany.
41. Chemistry, Biotechnology, Zoology.

(iii) Practicals in case prescribed for core subjects.

7. Any candidate who has passed the B.Sc. examination of the University shall be allowed to present himself for examination in any of the additional subjects prescribed for the B.Sc. examination and not taken by him at the degree examination. Such candidate will have to first appear and pass the B.Sc. Part I examination in the subjects which he proposes to offer and then the B.Sc. Part II and Part III examination in the same subject. Successful candidates will be given a certificate to that effect.
8. In order to pass at any part of the three year degree course examination an examinee must obtain not less than 33% of the total marks in each subject/group of subjects, in subject/group of subjects where both theory and practical examination are provided an examinee must pass in both theory and practical parts of the examination separately.
9. Candidate will have to pass separately at the Part I, Part II and Part III examinations. No division shall be assigned on the result of the Part I and Part II examinations. In determining the division of the final examination, total marks obtained by the examinees in their Part-I, Part II and Part III examination in the aggregate shall be taken in to account. Provided in case of candidate who has passed the examination through supplementary examination having failed in one subject/group only, the total aggregate marks being carried over for determining the division shall include actual marks obtained in the subject/group in which he appeared at the supplementary examination.
10. Successful examinee at the Part-III examination obtaining 60% or more marks shall be placed in the First Division, those obtaining less than 60% but not less than 45% marks in the Second Division and other successful examinees in the Third Division.

SCHEME OF EXAMINATION

Subject	Paper	Max. Marks	Total Marks	Min. Marks
Environmental Studies		75	100	33
Field Work		25		
Foundation Course				
Hindi Language	I	75	75	26
English Language	II	75	75	26
नोट :- प्रत्येक खंड में से 2 (दो) प्रश्न हल करने होंगे। सभी प्रश्न समान अंक के होंगे।				
Three Elective Subject :				
1. Physics	I	50	100	33
	II	50		
	Practical			
2. Chemistry	I	33	100	33
	II	33		
	III	34		
	Practical			
3. Mathematics	I	50	150	50
	II	50		
	III	50		
4. Botany	I	50	100	33
	II	50		
	Practical			
5. Zoology	I	50	100	33
	II	50		
	Practical			
6. Geology	I	50	100	33
	II	50		
	Practical			
7. Statistics	I	50	100	33
	II	50		
	Practical			
8. Anthropology	I	50	100	33
	II	50		
	Practical			

Subject	Paper	Max. Marks	Total Marks	Min. Marks
9. Defence Studies	I	50	100	33
	II	50		
	Practical		50	33
10. Micro Biology	I	50	100	33
	II	50		
	Practical		50	17
11. Computer Science	I	50	100	33
	II	50		
	Practical		50	17
12. Information Technology	I	50	100	33
	II	50		
	Practical		50	17
13. Industrial Chemistry	I	34	100	33
	II	33		
	III	33		
	Practical		50	17
14. Bio Chemistry	I	50	100	33
	II	50		
	Practical		50	17
15. Bio Technology	I	50	100	33
	II	50		
	Practical		50	17

USE OF CALCULATORS

The Students of Degree/P.G. Classes will be permitted to use of Calculators in the examination hall from annual 1986 examination on the following conditions as per decision of the standing committee of the Academic Council at its meeting held on 31-1-1986.

1. Student will bring their own Calculators.
2. Calculators will not be provided either by the University or examination centres.
3. Calculators with, memory and following variables be permitted +, -, x, , square, reciprocal, exponential, log, square root, trigonometric functions, sine, cosine, tangent etc. factorial summation, xy, yx and in the light of objective approval of merits and demerits of the viva only will be allowed.

PART - I

SULLABUS FOR ENVIRONMENTAL STUDIES" FOR UNDER GRADUATE

1. "इन्वाहमेन्टल साइंसेस" के पाठ्यक्रम को स्नातक स्तर भाग-एक की कक्षाओं में विश्वविद्यालय अनुदान आयोग के निर्देशानुसार अनिवार्य रूप से शिक्षा सत्र 2003-2004 (परीक्षा 2004) से प्रभावशील किया गया है। स्वशासी महाविद्यालयों द्वारा भी अनिवार्य रूप से अंगीकृत किया जाएगा।
भाग 1, 2 एवं 3 में से किसी भी वर्ष में पर्यावरण प्रश्न-पत्र उत्तीर्ण करना अनिवार्य है। तभी उपाधि प्रदाय योग्य होगी।
2. पाठ्यक्रम 100 अंको का होगा, जिसमें से 75 अंकर सैद्धांतिक प्रश्नों पर होंगे एवं 25 अंक क्षेत्रीय कार्य (Field Work) पर होंगे।
3. सैद्धांतिक प्रश्नों पर अंक - 75 (सभी प्रश्न इकाई आधार पर रहेंगे जिसमें आंतरिक विकल्प रहेगा)
(अ) लघु प्रश्नों पर - 25 अंक
(ब) निबंधात्मक - 50 अंक
4. Field Work - 25 अंकों का मूल्यांकन आंतरिक, मूल्यांकन पद्धति से कर विश्वविद्यालय को प्रेषित किया जाएगा। अभिलेखों की प्रयोगिक उत्तर पुस्तिकाओं के समान संबंधित महाविद्यालयों द्वारा सुरक्षित रखेंगे।
5. उपरोक्त पाठ्यक्रम से संबंधित परीक्षा का आयोजन वार्षिक परीक्षा के साथ किया जाएगा।
6. पर्यावरण विज्ञान विषय अनिवार्य विषय है, जिसमें अनुत्तीर्ण होने पर स्नातक स्तर भाग-एक के छात्र/छात्राओं को एक अन्य विषय के साथ पूरक की पात्रता होगी। पर्यावरण विज्ञान के सैद्धांतिक एवं फील्ड वर्क में संयुक्त रूप से 33% (तैतिश प्रतिशत) अंक उत्तीर्ण होने के लिए अनिवार्य होंगे।
7. स्नातक स्तर भाग-एक के समस्त नियमित/भूतपूर्व/अमहाविद्यालयीन छात्र/छात्राओं को अपना फील्ड वर्क सैद्धांतिक परीक्षा की समाप्ति के पश्चात 10 (दस) दिनों के भीतर संबंधित महाविद्यालय/परीक्षा केन्द्र में जमा करेंगे एवं महाविद्यालय के प्राचार्य/केन्द्र अधीक्षकों/परीक्षकों की नियुक्ति के लिए अधिकृत रहेंगे तथा फील्ड वर्क जमा होने के सात दिनों के भीतर प्राप्त अंक विश्वविद्यालय को भेजेंगे।

PART - I

SULLABUS FOR ENVIRONMENTAL STUDIES" FOR UNDER GRADUATE

(paper code - 0828)

M.M. 75

UNIT-I THE MULTI DISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:

Definition, scope and importance
Need for public awareness.

Natural Resources :

Renewable and nonrenewable resources :

Natural resources and associated problems.

- (a) Forest resources : Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people.
- (b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
- (c) Mineral resources : Use and exploitation, environmental effects of extracting and

using mineral resources, case studies.

- (d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- (e) Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- (f) Land resources : Land as a resources, land degradation, man induced landslides, soil erosion and desertification.
 - Role of an individual in conservation of natural resources.
 - Equitable use of resources for sustainable life-styles.

(9 Lecture)

UNIT-II ECOSYSTEMS

Concept of an ecosystems.

Structure and function of an ecosystem.

- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem :
 - a. Forest ecosystem
 - b. Grassland ecosystem
 - c. Desert ecosystem
 - d. Aquatic ecosystems (Ponds, streams, lakes, rivers, oceans, estuaries)

(9 Lecture)

UNIT-III Biodiversity and its Conservation

- Introduction - Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as mega-diversity nation.
- Hot-spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man/wildlife conflicts.
- Endangered and endemi species of India.
- Conservation of biodiversity : In situ and Ex-situ conservation of biodiversity

(9 Lecture)

UNIT-IV Environmental Pollution

Definition

- Causes, effects and control measures of -
 - a. Air pollution

- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- g. Nuclear hazards.

- Solid waste management : Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies
- Disaster management : floods, earthquake, cyclone and landslides.

Human Population and the Environment

- Population growth, variation among nations,
- Population explosion - Family Welfare Programme.
- Environment and human health.
- Human Rights.

(9 Lecture)

UNIT-V Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people, its problems and concerns, Case studies.
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Public awareness.
- Value Education
- HIV/AIDS
- Women and Child Welfare.
- Role of Information Technology in Environment and Human Health.
- Case Studies.

(9 Lecture)

FIELD WORK

- Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain.
- Visit to local polluted site : Urban/Rural/Industrial/Agriculture.

- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

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 21. Trivedi R.K., and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
 22. Wagner K.D., 1998, Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p.
- (M) Magazine
(R) Reference
(TB) Textbook.

आधार पाठ्यक्रम

प्रश्न पत्र - प्रथम

हिन्दी भाषा

(पेपर संख्या 0791)

पूर्णांक - 75

नोट :

1. प्रश्न पत्र 75 अंक का होगा।
2. प्रश्न पत्र अनिवार्य होगा।
4. इसके अंक श्रेणी निर्धारण के लिए जोड़े जावेंगे।
5. प्रत्येक इकाई के अंक समान होंगे।

पाठ्य विषय -

इकाई-1 पल्लवन, पत्राचार तथा अनुवाद एवं पारिभाषिक शब्दावली।

इकाई-2 मुहावरे-लोकोक्तियाँ, शब्दशुद्धि, वाक्य शुद्धि, शब्द ज्ञान-पर्यायवाची, विलोम, अनेकार्थी, समश्रुत (समानोचरित) अनेक शब्दों के लिए एक शब्द।

इकाई-3 देवनागरी लिपि की विशेषता, देवनागरी लिपि एवं वर्तनी का मानक रूप।

इकाई-4 कम्प्यूटर में हिन्दी का अनुप्रयोग, हिन्दी में पदनाम।

इकाई-5 हिन्दी अपठित, संक्षेपण, हिन्दी में संक्षिप्तिकरण।

पाठ्य क्रम के लिए पुस्तकें -

1. भारतीयता के स्वर साधन धनंजय वर्मा - म. प्र. ग्रंथ अकादमी।
2. नागरी लिपि और हिन्दी - अनंत चौधरी - ग्रंथ अकादमी पटना।
3. कम्प्यूटर और हिन्दी - हरिमोहन - तक्षशिला प्रकाशन, दिल्ली।

FOUNDATION COURSE

PAPER - II

ENGLISH LANGUAGE

M.M. 75

(paper code - 0792)

UNIT-1 Basic Language skills : Grammar and Usage.

Grammar and Vocabulary based on the prescribed text.

To be assessed by objective / multiple choice tests.

(Grammar - 20 Marks

Vocabulary - 15 Marks)

UNIT-2 Comprehension of an unseen passage.

05

.This should imply not only (a) an understanding of the passage in question, but also

(b) a grasp of general language skills and issues with reference to words and usage

within the passage and (c) the Power of short independent composition based on themes and issues raised in the passage.

To be assessed by both objective multiple choice and short answer type tests.

UNIT-3 Composition : Paragraph writing 10

UNIT-4 Letter writing (The formal and one Informal) 10

Two letters to be attempted of 5 marks each. One formal and one informal.

UNIT-5 Texts : 15

Short prose pieces (Fiction and not fiction) short poems, the pieces should cover a range of authors, subjects and contexts. With poetry if may sometimes be advisable to include pieces from earlier periods, which are often simpler than modern examples. In all cases, the language should be accessible (with a minimum of explanation and reference to standard dictionaries) to the general body of students schooled in the medium of an Indian language.

Students should be able to grasp the contents of each piece; explain specific words, phrases and allusions; and comment on general points of narrative or argument. Formal Principles of Literary criticism should not be taken up at this stage.

To be assessed by five short answers of three marks each.

BOOKS PRESCRIBED -

English Language and Indian Culture - Published by M.P. Hindi Granth Academy Bhopal.

PHYSICS

OBJECTIVES OF THE COURSE

The undergraduate training in Physics is aimed at providing the necessary inputs so as to set forth the task of bringing about new and innovative ideas/concepts so that the formulated model curricula in physics becomes in tune with the changing scenario and incorporate new and rapid advancements and multi disciplinary skills, societal relevance, global interface, self sustaining and supportive learning.

It is desired that under graduate i.e. B.Sc. level besides grasping the basic concepts of physics should in addition have broader vision. Therefore, they should be exposed to societal interface of physics and role of physics in the development of technologies.

EXAMINATION SCHEME :

1. There shall be 2 theory papers of 3 hours duration each and one practical paper of 4 hours duration. Each paper shall carry 50 marks.
2. Numerical problems of at least 30% will compulsorily be asked in each theory paper.
3. In practical paper, each student has to perform two experiments, one from each group as listed in the list of experiments.
4. Practical examination will be of 4 hours duration-one experiment to be completed in 2 hours.
The distribution of practical marks will be as follows:
Experiment : 15 + 15 = 30
Viva Voce : 10
Internal assessment : 10
5. The external examiner should ensure that atleast 16 experiments are in working order at the time of examination and submit a certificate to this effect.

PAPER - I

MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER.

(paper code - 0793)

- UNIT-1** Laws of motion, motion in a uniform field, components of velocity and acceleration in different coordinate systems. (Cartesian, Cylindrical and Spherical) uniformly rotating frame, centripetal acceleration, Coriolis force and its applications. Motion under a central force, Kepler's laws. Gravitational law and field.
Potential due to a spherical body. System of particles, center of mass, equation of motion, conservation of linear & angular momentum, conservation of energy.
- UNIT-2** Rigid body notion, rotational motion, moments of inertia and their products, principal moments & axes, Introductory idea of Euler's equations. potential well and periodic oscillations, case of harmonic small oscillations, differential equation and its solution, kinetic and potential energy, examples of simple harmonic oscillations, spring and mass system, simple and compound pendulum, torsional pendulum.
- UNIT-3** Bifilar oscillations, helmholtz resonator, LC circuit, vibrations of a magnet, oscillations of two masses connected by a spring. Superposition of two simple harmonic motions of the same frequency. Lissajous figures, case of different frequencies. Damped harmonic oscillator, power dissipation, quality factor, examples, driven (forced)

harmonic oscillator, transient and steady states, power absorption, resonance.

Note : (The emphasis here should be on the mechanical aspects and not on the details of the apparatus mentioned, which are indicated as applications of principles involved)

UNIT-4 E as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field- CRO sensitivity,

Transverse B field, 180° deflection, mass spectrograph, curvatures of tracks for energy determination, principle of a cyclotron. Mutually perpendicular E and B fields-velocity selector, its resolution. Parallel E and B fields, positive ray parabolas, discovery of isotopes, elements of mass spectrography, principle of magnetic focussing (lens.)

UNIT-5 Elasticity, small deformations, Hooke's law elastic constants for an isotropic solid and relations between them beams supported at both the ends, cantilever, torsion of cylinder, bending moments and shearing forces. Kinematics of moving fluids, equations of continuity, Euler's equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow. Poiseuille's law. Capillary tube flow, Reynold's number, Stokes law, surface tension and surface energy, molecular interpretation of surface tension, pressure on a curved liquids surface, wetting.

TEXT AND REFERENCE BOOKS :

E M Purcell, Ed Berkeley physics course, vol. Mechanics (Mc. Gr. Hill) R P Feynman, R B Lighton and M Sands, the Feynman lectures in physics, vol I (B) publications, Bombay, Delhi, Calcutta, Madras

D P Khandelwal, Oscillations and waves (Himalaya Publishing House Bombay)

R. K. Ghosh, The Mathematics of waves and vibrations (Macmillan 1975)

J.C. Upadhyaya- Mechanics (Hindi and English Edition.)

D.S. Mathur- Mechanics and properties of matter.

Brij Lal and Subramaniam- Oscillations and waves.

Resnick and Halliday- Volume I

PAPER - II

ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

(paper code - 0794)

UNIT-1 Functions of two and three variables, partial derivatives, geometrical interpretation of partial derivatives of functions of two variables. Total differential of a function of two and three variables. Repeated integrals of a function of more than one variable, definition of a double and triple integral. Scalars and vectors, dot and cross products, triple vector product, gradient of a scalar field and its geometrical interpretation, divergence and curl of a vector field, line, surface and volume integrals, flux of a vector field. Gauss's divergence theorem, Green's theorem and Stokes theorem.

UNIT-2 Coulomb's law in vacuum expressed in Vector forms calculations of E for simple distributions of charges at rest, dipole and quadrupole fields.

Work done on a charge in an electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Electric potential ϕ , $\vec{E} = -\nabla\phi$, torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, Gaussian pillbox? Fields at the surface of a conductor screening of E field by a conductor, capacitors,

electrostatic field energy, force per unit area of the surface of a conductor in an electric field; conducting sphere in a uniform electric field, point charge in front of a grounded infinite conductor.

UNIT-3 Dielectrics parallel plate capacitor with a dielectric, electric susceptibility, permittivity and dielectric constant, polarization and polarization vector, displacement vector \vec{D} , molecular interpretation of Clausius-Mossotti equation.

Steady current, current density J, non-steady currents and continuity equation, Kirchhoff's law and analysis of multiloop circuits, rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits, AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance, series and parallel resonance, Q factor, power consumed by an AC circuit, power factor.

UNIT-4 Force on a moving charge, Lorentz force equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio.

$\vec{\nabla} \cdot \vec{B} = 0$, $\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$. Biot and Savart's law, Ampere's law field due to a magnetic dipole, magnetization current, magnetization vector, magnetic permeability (Linear cases), interpretation of a bar magnet as a surface distribution of sinusoidal current.

UNIT-5 Electromagnetic induction, Faraday's law, electromotive force, $\epsilon = \int \vec{E} \cdot d\vec{r}$, integral and differential forms of Faraday's law Mutual and self inductance, Transformers, energy in a static magnetic field. Maxwell's displacement current, Maxwell's equations, electromagnetic field energy density.

The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector.

TEXT AND REFERENCE BOOK :

Berkeley Physics Course, Electricity and Magnetism, Ed. E.M. Purcell (Mc Graw - Hill)

Halliday and Resnik, Physics, Vol. 2

D J Griffith, Introduction to Electrodynamics (Prentice-Hall of India)

Rätz and Millford, Electricity and Magnetism (Addison-Wesley)

A S Mahajan and A A Rangwala, Electricity and Magnetism (Tata Mc Graw-hill)

A M Portis, Electromagnetic fields.

Pugh & Pugh, Principles of Electricity and Magnetism (Addison-Wesley)

Panofsky and Phillips, Classical Electricity and Magnetism, (India Book House)

S S Atwood, Electricity and Magnetism (Dover).

PRACTICAL

Minimum 16 (Eight from each group)

EXPERIMENTS OUT OF THE FOLLOWING OR SIMILAR EXPERIMENTS OF EQUAL STANDARD

GROUP-A

1. Study of laws of parallel and perpendicular axes for moment of inertia.
2. Study of conservation of momentum in two dimensional oscillations.
3. Study of a compound pendulum.

4. Study of damping of a bar pendulum under various mechanics.
5. Study of oscillations under a bifilar suspension.
6. potential energy curves of a 1- Double system and oscillations in it for various amplitudes.
7. Study of oscillations of a mass under different combinations of springs.
8. Study of bending of a cantilever or a beam.
9. Study of torsion of wire (static and dynamic methods)
10. Study of flow of liquids through capillaries.
11. Determination of surface tension of a liquid by different methods.
12. Study of viscosity of a fluid by different methods.

GROUP-B

1. Characteristics of a ballistic galvanometer.
2. Setting up and using an electroscopes or electrometer.
3. Use of a vibration magnetometer to study a field.
4. Study of B field due to a current.
5. Measurement of low resistance by Carey-Foster bridge or otherwise.
6. Measurement of inductance using impedance at different frequencies.
7. Study of decay of currents in LR and RC circuits.
8. Response curve for LCR circuit and resonance frequency and quality factor.
9. Sensitivity of a cathode-ray oscilloscope.
10. Characteristics of a choke.
11. Measurement of inductance.
12. Study of Lorentz force.
13. Study of discrete and continuous LC transmission lines.
14. Elementary Fortran programs, flowcharts and their interpretation.
15. To find the product of two matrices.
16. Numerical solution of equation of motion.
17. To find the roots of quadratic equation.

TEXT AND REFERENCE BOOKS:

- B. Saraf et al Mechanical Systems (Vikas Publishing House, New Delhi)
 D.P. Khandelwal, A Laboratory Manual of Physics for Undergraduate classes (Vani Publication House, New Delhi)
 C G Lambe Elements of Statistics (Longmans Green and Co London New York, Toronto)
 C Dixon, Numerical Analysis.
 S Lipsdutz and A Poe, Schaum's Outline of theory and problems of programming with fortran (MC Graw-Hill Book Company, Singapore 1986)

CHEMISTRY

The new curriculum will comprise of Three papers of 33.33 and 34 marks each and practical work of 50 marks. The curriculum is to be completed in 180 working days as per the UGC norms & conforming to the directives of the Govt. of Chhattisgarh. The theory papers are of 60 hrs. each duration & the practical work of 180 hrs. duration.

PAPER-I

INORGANIC CHEMISTRY

M.M. 33

(paper code - 0795)

UNIT-1 A. ATOMIC STRUCTURE

Idea of de-Broglie matter-waves, Heisenberg Uncertainty principle, Schrodinger wave equation, significance of Ψ and Ψ^2 , radial & angular wave functions and probability distribution curves, Atomic orbital and shapes of s, p, d orbital's, Aufbau and Pauli exclusion principles, Hund's Multiplicity rule, electronic configuration of the elements, effective nuclear charges.

B. PERIODIC PROPERTIES

Ionization energy, electron gain enthalpy and electro negativity, trend in periodic table and applications in predicting and explaining the chemical behavior.

UNIT-2 CHEMICAL BONDING

Covalent Bond : Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization & shapes of simple inorganic molecules and ions. Valence shell electron pair repulsion (VSEPR) theory to NH_3 , H_3O^+ , SF_4 , ClF_3 , ICl_2 and H_2O . M.O. Theory, homonuclear & heteronuclear bond strength & bond energy, percentage ionic character from dipole moment & electronegativity difference.

UNIT-3 CHEMICAL BONDING

Ionic Solids- Ionic structures, radius ratio & co-ordination number, limitation of radius, ratio rule, lattice defects, semiconductors, lattice energy Born- Haber cycle, Solvation energy and solubility of ionic solids, polarising power & polarisability of ions, Fajans rule, Metallic bond-free electron, Valence bond & band theories.

UNIT-4 A. s-BLOCK ELEMENTS

Comparative study, salient features of hydrides, solvation & complexation tendencies including their function in biosystems and introduction to alkyl & aryls, Derivatives of alkali and alkaline earth metals.

B. CHEMISTRY OF NOBLE GASES

Chemical properties of the noble gases, chemistry of xenon, structure binding in xenon compounds.

UNIT-5 A. p-BLOCK ELEMENTS

Halides hydrides, oxides and oxyacids of Boron, Aluminium, Nitrogen and Phosphorus, boranes, borazines, fullerenes and silicates, interhalogens and pseudohalogens.

B. INORGANIC CHEMICAL ANALYSIS

Chemical principles involved in the detection of acids and basic radicals including interfering radicals.

REFERENCE BOOKS :

1. Basic Inorganic Chemistry, F.A. Cotton, G. Wilkinson and P.L. Gaus, Wiley
2. Concise Inorganic Chemistry, J.D. Lee, ELBS
3. Concepts of models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.
4. Inorganic Chemistry, D.E. Shriver, P.W. Atkins and C.H.L. Angford, Oxford.
5. Inorganic Chemistry, W.W. Porterfield, Addison-Wesley.
6. Inorganic Chemistry, A.G. Sharp, ELBS.
7. Inorganic Chemistry, G.L. Miessler and D.A. Tarr, Prentice Hall.
8. Advanced Inorganic Chemistry, Satya Prakash
9. Advanced Inorganic Chemistry, Agarwal & Agarwal
10. Advanced Inorganic Chemistry, Puri & Sharma, S. Naginchand
11. Inorganic Chemistry, Madan, S. Chand
12. Aadhunik Akarbnic Rasayan, R.K. Shrivastav & P.S. Jain, Goel Publication.
13. Uchchattar Akarbnic Rasayan, Satya Prakash & G.D. Tuli, Shyamal Prakashan.
14. Uchchattar Akarbnic Rasayan, Puri & Sharma
15. Akarbnic Rasayan, Bhagchandni, Sahitaya Publication.
16. Rasayan Vigyan, Bhatnagar, Arun Publication.

PAPER - II**ORGANIC CHEMISTRY**

M.M. 33

(paper code - 0796)

UNIT-1 ELECTRONIC STRUCTURE & BONDING

- A. Resonance, Hyperconjugation, Inductive and other field effects, Aromaticity, hydrogen bonding.
- B. **MECHANISM OF ORGANIC REACTIONS**
Homolytic & heterolytic bond breaking, types of reagents-electrophiles & nucleophiles. Structure and reactivity of reaction intermediates-Carbocation, carbanions free radicals, carbenes and nitrenes.

UNIT-2 STEREOCHEMISTRY OF ORGANIC COMPOUNDS

- A. Optical Isomerism - enantiomers, diastereomers, threo and erythro meso compound, resolution of enantiomers, inversion, retention and racemization, Relative and absolute configuration, Sequence rules, D and L and R & S systems of nomenclature.
- B. Geometrical isomerism - Syn and anti forms, E & Z system of nomenclature, properties of cis-trans isomers.

UNIT-3 ALIPHATIC AND AROMATIC RING COMPOUNDS

- A. Cycloalkanes- Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring: banana bonds,

- B. Mono-nuclear and polynuclear aromatic ring. Structure of benzene & naphthalene. Molecular formula and Kekule structure. Aromatic electrophilic substitution. General pattern of the mechanism, role of σ and π complexes. Electrophilic substitution in naphthalene.

UNIT-4 ALKENES, DIENES AND ALKYNES

- A. Mechanism of dehydration of alcohols.
- B. Chemical reactions of alkenes- Mechanisms involved in electrophilic and free radical additions, hydroboration-oxidation, oxymercuration-reduction, epoxidation. Substitution at the allylic and vinylic positions of alkenes. Structure of allenes and butadiene, chemical reaction- 1,2 and 1,4 addition, Diel-Alder reaction. Chemical reactions of alkynes and acidity of alkynes. Electrophilic and nucleophilic addition reactions, hydroboration and oxidation with ozone and KMnO_4 .

UNIT-5 ARENES AND AROMATICITY**A. Alkyl halides and Aryl Halides**

Mechanism and stereochemistry of nucleophilic substitution reactions and alkyl halides and aryl halides with energy profile diagrams. SN_1 , SN_2 , SN_i mechanisms.

- B. Mechanisms and stereochemistry of elimination reaction and alkyl halides. Elimination Vs Substitution.

REFERENCE BOOK :

1. Organic Chemistry, Morrison and Boyd, Prentice-Hall
2. Organic Chemistry, L.G. Wade Jr, Prentice-Hall
3. Fundamentals of Organic Chemistry, Solomons, John Wiley
4. Organic Chemistry, Vol. I, II, III, S.M. Mukherjee, S.P. Singh and R.P. Kapoor, Wiley-eastern (New-Age).
5. Organic Chemistry, F.A. Carey, MC Graw Hill
6. Introduction to Organic Chemistry, Struweisser, Heathcock and Kosover, Macmillan.
7. Organic Chemistry, P.L. Soni.
8. Organic Chemistry, Bahi & Bahl
9. Organic Chemistry, Joginder Singh.
10. Carbanic Rasayan, Bashi & Bahi
11. Carbanic Rasayan, R.N. Singh, S.M.I. Gupta, M.M. Bakodia & S.K. Wadhwa.
12. Carbanic Rasayan, Joginder Singh.
13. Carbanic Rasayan, P.L. Soni.
14. Carbanic Rasayan, Bhagchandani, Sahitya Bhawan Publication.
15. Rasayan Vigyan, Bhatnagar, Arun Prakashan.

PAPER - III
PHYSICAL CHEMISTRY
(paper code - 0797)

M.M.34

UNIT-1 MATHEMATICAL CONCEPTS FOR CHEMIST AND COMPUTER

- A. Logarithmic relations, curve sketching linear graphs, Properties of straight line, sloped and intercept, Differentiation of functions, Partial differentiation, Integration of some useful and relevant functions, Maxima and minima, Permutation and combination, Probability.
- B. General introduction to computers, components of computer, hardware and software, input and output devices; binary numbers, Introduction to computer languages, Programming, Operation systems.

UNIT-2 A. MOLECULAR VELOCITIES :

Root mean square velocity average and most probable velocities, Maxwell's law of distribution of molecular velocities of gases, (Graphical interpretation), effect of temperature on distribution of molecular velocities, collision frequency, mean free path, Joule-Thompson effect, Liquification of gases.

- B. Deviation from ideal behavior, Real gases, Vander Waal equation of state, Relationship, Vander waal constant and critical constants, Law of corresponding state.

UNIT-3 A. LIQUID STATE

Inter molecular forces, magnitude of intermolecular force, structure of liquids, Properties of liquids, viscosity and surface tension.

- B. Ideal and non ideal solutions, modes of representing concentration of solutions, activity and activity coefficient.

Dilute solution : Colligative Properties, Lowering of vapor pressure of solvent, Raoult's law, Osmosis, Vant Hoff Theory of dilute solutions, measurements of Osmotic pressure, relationship between lowering of vapour pressure and osmotic pressure. Elevation of boiling point, Depression in freezing point, abnormal molar masses, Depression of dissociation and association of solutes, Vant Hoff factor.

UNIT-4 A. LIQUID CRYSTALS :

Difference between liquid Crystal, solids and liquids, Classification, Structure of nematic and cholesteric phases, Thermography, Seven segment cell, applications of liquid Crystals.

B. COLLOIDAL STATE :

Classification, Optical, Kinetic, and Electrical Properties of colloid, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelle. Gel, Syneresis and thixotropy, Application of colloid.

C. SOLID STATE

Space lattices, unit cells, Elements of Symmetry in crystallize solids, X-rays diffraction, Miller indices, identification of unit cell by Bragg's Spectrometer, Powder method, Neutron and electron diffraction (Elementary idea only)

UNIT-5 A. CHEMICAL KINETICS

Rate of reaction, Factors influencing rate of reaction, rate constant, Order and

molecularity of reactions, Zero, first and second order reaction, methods of determining order of reaction, Complex reactions : Consecutive, opposing and side reactions, Chain reactions.

Temperature dependence of reaction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non mathematical concept of transition state theory.

B. CATALYSIS

Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristic of Catalyst, Enzyme Catalysed reactions, Micellar catalysed reactions, Industrial applications of Catalysis.

REFERENCE BOOKS :

1. Physical chemistry, G.M. Barrow, International student edition, MC Graw Hill
2. Basic programming with application, V.K. Jain, Tata Mc Graw-Hill
3. Computers & Common sense, R. Hunt & Shelly, Prentice-Hall
4. University general chemistry, C.N.R. Rao Macmillan.
5. Physical Chemistry, R.A. Alberty, Wiley Eastern.
6. The elements of Physical Chemistry, P.W. Atkins, Oxford.
7. Physical Chemistry through problems, S.K. Dogra & Dogra, Wiley Eastern.
8. Physical Chemistry, B.D. Khosla
9. Physical Chemistry, Puri & Sharma
10. Bhoutic Rasayan, Puri, Sharma & Palhanian, Vishal Publishing Company.
11. Bhoutic Rasayan, P.L. Sohi
12. Bhoutic Rasayan, Bahi & Tuli.
13. Bhoutic Rasayan, I. R. Gambin
14. Bhoutic Rasayan, Bhagchandani, Sahitya Bhawan Publication.
15. Rasayan Vigyan, Bhatnagar, Arun Prakashan.

PAPER - IV
LABORATORY COURSE

180 Hrs.

The following experiments are to be conducted during the curriculum

1. Inorganic Chemistry

Semimicro Analysis - cations analysis, separation and identification of ions from Pb^{2+} , Bi^{3+} , Cu^{2+} , Cd^{2+} , Sb^{3+} , Sn^{2+} , Sn^{4+} , Fe^{3+} , Al^{3+} , Cr^{3+} , Ni^{2+} , Co^{2+} , Zn^{2+} , Mn^{2+} , Ba^{2+} , Sr^{2+} , Ca^{2+} , Mg^{2+} , NH_4^+ and Anions CO_3^{2-} , SO_3^{2-} , S^{2-} , SO_4^{2-} , NO_2^- , NO_3^- , Cl^- , Br^- , I^- , CH_3COO^- , $C_2O_4^{2-}$, BO_3^{3-} , F^- .

2. Organic Chemistry

i. Calibration of Thermometer

$80^\circ - 82^\circ$ (Naphthalene), $113.5^\circ - 114^\circ$ (Acetanilide), $132.5^\circ - 133^\circ$ (Urea), 100° (Distilled Water)

ii. Determination of Melting Point

- 80° – 82° (Naphthalene), Benzoic acid 121.5° – 122°, Urea 132.5° – 133°, Succinic acid 184.5° – 185°, Cinnamic acid 132.5° – 133°, Salicylic acid 157.5° – 158°, Acetanilide 113.5° – 114°, m- Dinitrobenzene 90°, p-Dichlorobenzene 52° Aspirin 135°.
- iii. Determination of boiling points
Ethanol = 78°, Cyclohexane 81.4°, Toluene 110.6°, Benzene 80°.
 - iv. Mixed Melting point Determination
Urea- Cinnamic acid mixture of various compositions (1 : 4, 1 : 1, 4 : 1)
 - v. Distillation (Demonstration)
Simple distillation of ethanol- water mixture using water condenser.
Distillation of nitrobenzene and aniline using air condenser.
 - vi. Crystallization
Phthalic acid from hot water (using fluted filter paper and stemless funnel).
Acetanilide from boiling water
Naphthalene from ethanol
Benzoic acid from water.
 - vii. Decolorisation and crystallisation using charcoal
Decolorisation of brown sugar with animal charcoal using gravity filtration
Crystallization and decolorisation of impure naphthalene (100g of naphthalene mixed with 0.3g of Congo red using 1g of decolorising carbon) from ethanol.
 - viii. Sublimation
Camphor, Naphthalene, Phthalic acid and Succinic acid
 - ix. Qualitative Analysis
Detection of elements (N, S and halogens) and functional groups (Phenolic, Carboxylic, Carbonyl, Esters, Carbohydrates, Amines, Amides, Nitro and Anilide) in simple organic compounds.
3. Physical Chemistry
- (i) Chemical Kinetics
To determine the specific rate of hydrolysis of methyl/ ethyl acetate catalysed by hydrogen ions at room temperature.
To study the effect of acid strength on the hydrolysis of an ester
To compare the strengths of HCl & H₂SO₄ by studying the kinetics of hydrolysis of ethyl acetate
To study kinetically the reaction between H₂O₂ & Iodide
 - (ii) Distribution Law
To study distribution of iodide between water & CCl₄
To study distribution of benzoic acid between benzene & water.
 - (iii) Colloids
To prepare arsenious sulphide sol & compare the precipitating power of mono-, bi, & tri valent anions.
 - (iv) Viscosity & Surface Tension

To determine the % composition of a given mixture (Non interacting system) by viscosity method.

To determine the viscosity of amyl alcohol in water at different concentrations & calculate the excess viscosity of these solutions.

To determine the % composition of a given binary mixture by surface tension method (acetone & ethyl methyl ketone).

BOOK :

1. Vogel's qualitative analysis, revised edition, Orient Longman.
2. Standard methods of chemical analysis, W.W. Scott, The Technical Press
3. Experimental Organic Chemistry, Vol. I & II, P.R. Singh, D.S. Gupta & K.S. Bajpai, Tata Mc Graw Hill
4. Manual inorganic chemistry, R.K. Bansal Wiley Eastern
5. Vogel's text book of practical organic chemistry, B.S. Furnis A.J. Hannaford, V. Rogers, P.W.G. Smith & A.R. Tatchell, ELBS
6. Experiments in general chemistry, CNR Rao & U.C. Agarwal
7. Experiments in physical chemistry, R. C. Das & B. Behara Tata Mc Graw Hill
8. Advanced practical physical chemistry, J.B. Yadav, Goel publishing house

PRACTICAL EXAMINATION

05 Hrs.

Three experiments are to be performed

M.M. 50

1. Inorganic Mixture Analysis, four radicals two basic & two acid (insoluble, interfering & combination of acid radicals) any one to be given. 12 Marks.
 2. Detection of functional group in the given organic compound and determine its MP/BPT. 8 marks
- OR
- Crystallization of any one compound as given in the prospectus along with the determination of mixed MP.
- OR
- Decolorisation of brown sugar along with sublimation of camphor/ Naphthalene.
3. Any one physical experiment that can be completed in two hours including calculations. 14 marks
 4. Viva 10 marks
 5. Sessionals 06 marks

In case of Ex-Students two marks will be added to each of the experiments.

ZOOLOGY

PAPER - I (paper code - 0813)

(CELL BIOLOGY & INVERTEBRATES)

M.M. 50

- UNIT-1** The Cell (Prokaryotic & Eukaryotic)
Methods in cell biology (Microscopy light & Electron)
Organisation of cell extranuclear and nuclear (Plasma membrane, mitochondria, chromosomes, ER, Golgi bodies, Ribosomes)
- UNIT-2** Cell divisions (Mitosis & Meiosis)
An elementary idea of cell transformation & Cancer Immunity (elementary idea)
- UNIT-3** General Characteristics & Classification of invertebrates upto orders with examples
Protozoa - type study *Paramoecium*, protozoa & disease
Porifera - type study *Sycon*
Coelenterata - type study *Obelia*
- UNIT-4** Helminths - type study *fasciola*
Annelida - type study *Pheretima*
Arthropoda - type study *Palaemon*
- UNIT-5** Mollusca - type study *Asterias* (starfish)
Protochordata - type study *Balanoglossus*

PAPER - II (paper code - 0814)

(VERTEBRATES & EMBRYOLOGY)

M.M. 50

- UNIT-1** Origin and classification of Chordates.
Protochordata - type study *Amphioxus*.
A comparative account of *Petromyzon* & *Myxine*
- UNIT-2** Fishes - Skin and scales
Migration in fishes
Parental care
Amphibia - Parental care
Neoteny
Reptilia - Poisonous & non poisonous snakes, Poison apparatus, snake venom.
- UNIT-3** Aves - Flight adaptation in birds
Discuss - Birds are glorified reptiles
Mammals- comparative account of prototheria, metatheria & Eutheria and Affinities.
- UNIT-4** Gametogenesis, Fertilization & Parthenogenesis.
Development of frog upto formation of three germ layers
- UNIT-5** Development of Chick upto formation of three germ layer, Extra embryonic membranes.
Placenta in mammals.
Embryonic induction organisers & differentiation.

PARACTICAL

M.M. 50

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show a knowledge of the following.

1. Dissection of earth worm.
2. Dissection of Cockroach, *Palaemon*, *Pila*.

3. Minor Dissection- Appendages of Prawn & hastate plate, Mouth-parts of Insects, Radula of *Pila*.
4. Mounting-Setae, Spermatheca, Septal Nephridia, Nerve ring & ovary of earth worm/ Parapodia of *Nereis* Salivary gland of Cockroach, ctenidium of *pila*, Malpighian tubules.
5. Cytological preparation- Onion root-tip "Squash Preparation" for mitosis/Grasshopper testis squash for meiosis.
6. Osteology-Frog & Rabbit
7. Museum Specimen invertebrate & Vertebrate, frog embryology.
8. Slides-Chick embryology, Cytology, Mammal Histology, Bird feather & invertebrate Slides.

Scheme of Practical Exam.

Time 3 Hrs,

M.M. 50

- | | |
|------------------------------------------------|----------|
| 1. Major Dissection | 8 Marks |
| 2. Minor Dissection | 6 Marks |
| 3. Mounting | 5 Marks |
| 4. Cytological Preparation | 5 Marks |
| 5. Spots- 8 (Slides-4, Specimens-2, & Bones-2) | 16 Marks |
| 6. Sessional | 10 Marks |

BOTANY

PAPER - I

(GENERAL DIVERSITY OF MICROBES AND CRYPTOGRAMS) M.M. 50
(paper code - 0811)

- UNIT-1** Viruses and Bacteria: General account of viruses and mycoplasma; bacteria structure; nutrition, reproduction and economic importance; general account of cyanobacteria. 12 Hrs.
- UNIT-2** Algae: General characters, classification and economic importance; important features and life history of Chlorophyceae-Volvoc, Oedogonim, Coleochaete; Xanthophyceae-Vaucheria; Phaeophyceae- Ectocarpus, Sargassum; Rhodophyceae- Polysiphonia. 12 Hrs.
- UNIT-3** Fungi: General characters, classification and economic importance; important features and life history of Mastigomycotina- Pythium, Phytophthora; Zygomycotina- Mucor, Ascomycotina-Saccharomyces, Eurotium, Chaetomium, Peziza; Basidiomycotina-Puccinia, Agaricus; Deuteromycotina-Cercospora, Colletotrichum; general account of Lichens. 12 Hrs.
- UNIT-4** Bryophyta: Amphibians of plant kingdom displaying alternation of generations; structure, reproduction and classification of Hepaticopsida (e.g. Riccia Marchantia); Anthocerotopsida (e.g. Anthoceros), Bryopsida (e.g. Funaria) 12 Hrs.
- UNIT-5** Pteridophyta: The first vascular plants; important characteristics of Psilopsida, Lycopsida, Sphenopsida and Pteropsida; structure, Reproduction in Rhynia, Lycopodium Selaginella, Equisetum, Pteris and Marsilea.

BOTANY

PAPER - II

CELL BIOLOGY AND GENETICS

(paper code - 0812)

- UNIT-1** The cell envelope: Plasma membrane; bilayer lipid structure; functions; the cell wall. Ultra structure and function of nucleus: nuclear membrane; nucleolus and other organelles: Golgi bodies, ER, peroxisomes, Vacuoles. 12 Hrs.
- UNIT-2** Chromosome organization: Morphology; centromere and telomere; chromosome alterations; deletions, duplications, translocations, inversions; variations in chromosome number aneuploidy, polyploidy; sex chromosomes. Cell division : Mitosis; meiosis 12 Hrs.
- UNIT-3** DNA the genetic material: DNA structure; replication; DNA- protein interaction; the nucleosome model; genetic code; satellite and repetitive DNA. Extranuclear genome: Presence and function of mitochondrial and plastid DNA; plasmids. 12 Hrs.

B.Sc.-I

(26)

- UNIT-4** Gene expression: Structure of gene; transfer of genetic information; transcription, translation, protein synthesis; tRNA; ribosomes; regulation of gene expression in prokaryotes and eukaryotes; proteins, 1D, 2D and 3D structure. 12 Hrs.
- UNIT-5** Genetic Variations: Mutations, spontaneous and induced; transposable genetic elements; DNA damage and repair. Genetic inheritance: Mendelism; laws of segregation and independent assortment; linkage analysis; allelic and non-allelic interactions. 12 Hrs.

BOTANY PRACTICAL

Time : 3 Hrs

Marks-50

- | | |
|-------------------------------------|----|
| 1. Algae/Fungi | 10 |
| 2. Bryophyta/ Pteridophyta | 10 |
| 3. Disease Symptoms/Gram's Staining | 05 |
| 4. Cytology/Genetics | 05 |
| 5. Spots (1-5) | 10 |
| 6. Viva Voce | 05 |
| 7. Sessionals | 05 |

50 marks

B.Sc.-I

(27)

MATHEMATICS
PAPER - I
ALGEBRA AND TRIGONOMETRY
(paper code - 0798)

- UNIT-1** Symmetric, Skew symmetric, Hermitian and skew hermitian, matrices. Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, Column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, Eigen vectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.
- UNIT-2** Application of Matrices to a system of linear (both homogeneous and nonhomogeneous) equations. Theorems consistency of a system of linear equations. Relation between the roots and coefficients of general polynomial equations in one variable. Transformation of equations. Descartes's rule of signs. Solutions of cubic equations (Cardans Method), Biquadratic equation.
- UNIT-3** Mappings, Equivalence relations and partitions. Congruence modulo n . Definition of a group with examples and simple properties. Cyclic groups generators, Coset decomposition, Lagrange's theorem and its consequences. Formate and Euler's theorems. Normal subgroups. Quotient group, Permutation groups, Even and odd permutations the alternating groups. Cayley's theorem A_n .
- UNIT-4** Homomorphism and Isomorphism the fundamental theorems of homomorphism. Introduction, properties and examples of Rings, Subrings, Integral domain and fields Characteristic of a ring and field.

TRIGONOMETRY :

- UNIT-5** De Moivre's theorem and its applications. Direct and inverse Circular and Hyperbolic functions. Logarithm of a complex quantity. Expansion of Trigonometrical functions. Gregory's series. Summation of series.

TEXT BOOK :

1. I.N. Herstein, Topics in Algebra Wiley Eastern Ltd., New Delhi, 1975
2. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd. New Delhi, 2000.
3. Chandrika Prasad, Text-Book on Algebra and Theory of equations, Pothishala Private Ltd., Allahabad.
4. S.L. Loney, Plane Trigonometry Part II, Macmillan and Company, London.

REFERENCES :

1. I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. K.B. Datta, Matrix an linear algebra, Prentics Hall of India Pvt. Ltd. New Delhi, 2000.
3. P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, First Course in linear Algebra, Wiley Eastern, New Delhi, 1983.
4. P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, Basic Abstract Algebra (2 edition), Cambridge University Press, Indian Edition, 1997.
5. S.K. Jain, A. Gunawardena and P.B. Bhattacharya, Basic linear Algebra with MATLAB, Key College Publishing (Springer-Verlag), 2001.
6. H.S. Hall and S.R. Knight, Higher Algebra, H.M. Publications, 1994.
7. Chandrika Prasad, Text-Book on Algebra and Theory of Equations, Pothishala Private Ltd., Allahabad.
8. S.L. Loney, Plane Trigonometry Part II, Macmillan and Company, London.
9. R.S. Verma and K.S. Shukla, Text Book on Trigonometry, Pothishala Pvt. Ltd., Allahabad.

PAPER - II
CALCULUS
(paper code - 0799)

DIFFERENTIAL CALCULUS :

- UNIT-1** $\epsilon - \delta$ definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuities. Differentiability. Successive differentiation. Leibnitz theorem. Maclaurin and Taylor series expansions.
- UNIT-2** Asymptotes curvature. Tests for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in Cartesian and polar coordinates.

INTEGRAL CALCULUS:

- UNIT-3** Integration of irrational algebraic functions and transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.

ORDINARY DIFFERENTIAL EQUATIONS :

- UNIT-4** Degree an order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations and equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x , y , p . Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.
- UNIT-5** Linear differential equations of second order. Transformation of the equation by changing the dependent variable/the independent variable. Method of variation of parameters. Ordinary simultaneous differential equations.

TEXT BOOK :

1. Gorakh Prasad, Differential Calculus, Pothishala Private Ltd. Allahabad.
2. Gorakh Prasad, Integral Calculus, Pothishala Private Ltd. Allahabad.
3. D.A. Murray Introductory Course in Differential Equations, Orient Longman (India), 1976.

REFERENCES :

1. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
2. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum's outline series, Schaum Publishing Co. New York.
3. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow.
4. P.K. Jain and S.K. Kaushik, An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.
5. Gorakh Prasad, Differential Calculus, Pothishala private ltd. Allahabad.
6. Gorakh Prasad Integral Calculus, Pothishala Private ltd. Allahabad.
7. D.A. Murray, Introductory Course in Differential Equations, Orient Longman (India), 1967.
8. G.F. Simmons, Differential Equations, Tata Mc Graw Hill, 1972.
9. E.A. Coddington, An Introduction to Ordinary Differential Equations, Prentics Hall of India, 1961.
10. H.T.H. Piaggio, Elementary Treatise on Differential Equations and their Applications, C.B.S. Publishe & Distributors, Dehli, 1985.

11. W.E. Boyce and P.O. Diprima, Elementary Differential Equations and Boundary Value Problems, John Wiley, 1986.
12. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, 1999.

PAPER - III
VECTOR ANALYSIS AND GEOMETRY **M.M. 50**
 (paper code - 0800)

VECTOR ANALYSIS :

- UNIT-1** Scalar and vector product of three vectors. Product of four vectors. Reciprocal Vectors. Vector differentiation. Gradient, divergence and curl.
- UNIT-2** Vector integration. Theorems of Gauss, Green, Stokes and problems based on these.
- UNIT-3** General equation of second degree. Tracing of conies. System of conies. Confocal conies. Polar equation of a conic.
- UNIT-4** Plane the Straight line and the plane. Sphere cone. Cylinder.
- UNIT-5** Central Conicoids. Paraboloids. Plane sections of conicoids. Generaing lines. Confocal Conicoids. Reduction of second degree equations.

TEXT BOOKS :

1. N. Saran and S.N. Nigam, Introduction to vector Analysis, Pothishala Pvt. Ltd. Allahabad.
2. Gorakh Prasad and H.C. Gupta, Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad.
3. R.J.T. Bill, Elementary Treatise on Coordinate Geometry of three dimensions, Machmillan India Ltd. 1994.

REFERENCES :

1. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Company, New York.
2. Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.
3. N. Saran And S.N. Nigam Introduction to Vector Analysis, Pothishala Pvt. Ltd., Allahabad.
4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 1999.
5. Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Co., New Delhi.
6. S.L. Loney, The Elements of Coordinate Geometry, Macmillan and Company, london.
7. Gorakh Prasad and H.C. Gupta, Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad.
8. R.J.T. Bill, Elementary Treatise on Coordinate Geometry of three Dimensions, Macmillan India Ltd., 1994.
9. P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of two Dimensions, Wley Eastern Ltd., 1994.
10. P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of three Dimensions, Wley Eastern Ltd., 1999.
11. N.Saran and R.S. Gupta, Analytical Geometry of three Dimensions, Pothishala Pvt. Ltd. Allahabad.

MICROBIOLOGY
PAPER - I **M.M. 50**
GENERAL MICROBIOLOGY
 (paper code - 0819)

- UNIT-1** Unity of microbial world, scope of microbiology, Microbiology and human health, beneficial and harmful microbes. development of microbiology (contributions and pioneers)
- UNIT-2** Diversity of microbial world: principle of classification, classification of viruses, Bacteria (including Cyanobacteria) Algae and Fungi (including yeast) and protozoa.
- UNIT-3** Methods of studying microorganism: Origin of microbes, microscopy, pure culture techniques, Sterilization, Aseptic techniques, isolation of pure culture, conditions and media for growth of microorganisms in the laboratory.
- UNIT-4** General organization of microbes; Structural functional organization and economic importance of algae (*Nostoc, anabaena, Ocillitoria*), fungi (*Rhizopus, Penicillium, Aspergillus*), yeast and lichens.
- UNIT-5** Structure, Functional organization and economic importance of bacteria (Gram +ve and Gram -ve), viruses (Plant and Animal) and protozoa (Ciliates, Flagellates and Sporozoans).

TEXT BOOKS :

1. General Microbiology by Brock.
2. Microbiology by Black.
3. General Microbiology by Pelzar et al.
4. Introduction on Microbial Techniques by Gunasekaran.

PAPER - II
BIOCHEMISTRY AND IMMUNOLOGY **M.M. 50**
 (paper code - 0820)

- UNIT-1** Structure and properties of mono and disaccharides, amino acids and peptides, bases; purines and pyrimidens, sugars; ribose, deoxyribose and nucleoside and nucleotide; general account of lipids.
- UNIT-2** concept of macromolecules; Structural and functional organization of polysaccharides (starch, glycogen, cellulose, mucopolysaccharides), proteins and nucleic acids (DNA, RNA).
- UNIT-3** Enzymes; historical account, classification, Co-enzymes and their role. Enzyme action, Enzyme kinetic. Km, Vm and Enzyme inhibition. Allosteric enzyme and isoenzyme. Extracellualar enzymes and their role.
- UNIT-4** Metabolism; General concept of metabolims (anabolism, catabolism and amphibolism). Glycolysis TCA Cycle and HMP Shunt. Anaerobic catabolims of glucose; alpha, beta and gamma oxidation of fatty acids.