

JAI PRAKASH UNIVERSITY,  
CHAPRA

SYLLABUS

for

Bachelor of Science and Commerce  
(Honours and Subsidiary)

TDC - II

**JAI PRAKASH UNIVERSITY  
CHAPRA**

**COURSES OF STUDY**

**FOR**

**B.Sc. / B.Com.**

**(GENERAL AND HONOURS )**

**Part II EXAMINATIONS**



**JAI PRAKASH UNIVERSITY PUBLICATION**

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## COURSES OF STUDY

for

B.A./B.Sc./B.Com (General/Honours) PART II Examination  
COMPULSORY SUBJECTS

(Identical syllabi for both General &amp; Honours Courses for all faculties)

अनिवार्य हिन्दी रचना

द्वितीय पत्र

(हिन्दी-भाषा-भाषी विद्यार्थियों के लिए)

[बी०ए०, बी० एससी० एवं बी० कॉम० (प्रतिष्ठा तथा सामान्य) के लिए]

समय- तीन घंटे

पूर्णांक-100

अंक विभाजन

(क)	निर्धारित पाठ्य पुस्तक से पाँच वस्तुनिष्ठ प्रश्न	5×1= 05
(ख)	निर्धारित पाठ्य पुस्तकों से दो परिचायत्मक प्रश्न	2×15 = 30
(ग)	पाठ्य पुस्तक 'काव्यतारा' से एक अर्थ लेखन	1×5 =05
(घ)	प्रयोजनमुलक हिन्दी से एक सैद्धान्तिक प्रश्न	1×15 =15
(ङ.)	व्यावहारिक हिन्दी रचना से तीन प्रश्न :	
	(1) पल्लवन	1×10 =10
	(2) अवबोध	1×10 =10
	(3) व्यावसायिक पत्र-लेखन	1×10 =10
(छ)	निबन्ध - एक प्रश्न	1×15 =15
		100

निर्धारित पाठ्य पुस्तकें :-

- (1) 'काव्यतारा' - सं० - बद्रीनाथ तिवारी - राजकमल प्रकाशन  
डॉ० राजेन्द्र प्र० सिंह नई दिल्ली, पटना  
विद्यापति - जय-जय भैरवि असुर भयाउहन, कबीरदास - साखी -  
1 से 10, सूरदास - बाल लीला के पद - समस्त, तुलसीदा - रामायतन  
- 1 से 4, विहारीलाल - 11 से 20 दोहा, प्रसाद - ले चल वहाँ भुलावा  
देकर, निराला - सुन्दरी, पंत - प्रथम रश्मि, महादेवी - पथ होने दो  
अपरिचित, दिनकर - किसको नमन करे, नागार्जुन - कालिदास, भवानी  
प्रसाद मिश्र - मंगलवर्ष
- (2) गद्य धारा - सं० सुशाली कुमार महेश्वरी, राजकमल प्रकाशन

(3) प्रयोजनमूलक हिन्दी के लिए आधार ग्रन्थ

प्रयोजनमूलक हिन्दी – विनोद गोदरे – वाणी प्रकाशन, नई दिल्ली

प्रयोजनमूलक हिन्दी – दंगल झाल्टे – वाणी प्रकाशन, नई दिल्ली

केवल निर्धारित अंश –

1. प्रयोजनमूलक हिन्दी की विशेषताएँ
2. अनुवाद : अर्थ एवं भेद
3. प्रारूप लेखन
4. जन संचार के विविध आयाम
5. कम्प्यूटर एवं राजभाषा हिन्दी

सहायक पुस्तकें –

1. प्रयोजनमूलक हिन्दी : स्वरूप और संभावनाएँ – डॉ० अवधेश्वर अरूण
2. प्रयोजनमूलक हिन्दी – बालेन्दु शेखर तिवारी
3. व्यावहारिक हिन्दी भाषा-संरचना – डॉ० दिनेश सिंह
4. आधुनिक हिन्दी व्याकरण और रचना – डॉ० वासुदेव नन्दन प्रसाद

### अनिवार्य हिन्दी रचना

#### द्वितीय पत्र

(हिन्दीतर-भाषा-भाषियों के लिए)

[बी०ए०, बी० एससी० एवं बी० कॉम० (प्रतिष्ठा तथा सामान्य) के लिए]

समय- डेढ़ घंटे

पूर्णांक-50

अंक विभाजन

(क) निर्धारित पाठ्य पुस्तकों से दो आलोचनात्मक प्रश्न  $2 \times 10 = 20$

(ख) निर्धारित पाठ्य पुस्तकों के पठित पाठ से सम्बद्ध

पाँच वस्तुनिष्ठ प्रश्न

$1 \times 5 = 05$

(ग) निबन्ध लेखन

$10 \times 1 = 10$

(घ) व्यावहारिक हिन्दी रचना से तीन प्रश्न

$5 \times 3 = 15$

केवल – 1. संक्षेपण 2. पल्लवन 3. लिंग-निर्णय

4. मुहावरे एवं लोकोक्तियाँ 5. पत्र – लेखन 6. अवबोध

50

निर्धारित पाठ्य पुस्तकें :-

(1) काव्य सुधा – सं०- डॉ० मंजू ज्योत्सना – राजकमल प्रकाशन

डॉ० नागेश्वर सिंह नई दिल्ली, पटना

डॉ० बालेन्दु शेखर तिवारी

केवल निर्धारित अंश -

मैथलीशरण गुप्त - यशोधरा

सूर्यकान्त त्रिपाठी 'निराला' - जागो फिर एक बार

सुमित्रानन्दन पंत - सुख-दुःख

हरिवंश राय बच्चन - अग्निपथ

रामधारी सिंह 'दिनकर' - मनुज का श्रेय

(2) हिन्दी निबन्ध - सं० रामदरश मिश्र - राधाकृष्ण प्रकाशन

डॉ० रामसरूप शास्त्री

( केवल-महावीर प्रसाद द्विवेदी प्रभात, सरदार पूरन सिंह-आचरण की सभ्यता, रामचन्द्र शुक्ल - तुलसी की काव्य पद्धति, हजारी प्रसाद द्विवेदी - आम फिर बौरा गये, महादेवी वर्मा - रामा )

सहायक पुस्तकें -

1. आधुनिक हिन्दी व्याकरण और रचना - डॉ० वासुदेव नन्द प्रसाद
2. व्यावहारिक हिन्दी भाषा-संरचना - डॉ० दिनेश सिंह, मोतीलाल बनारसीदास, पटना
3. बृहत् व्याकरण भास्कर - डॉ० वचनदेव कुमार  
छात्रों को पर्याप्त विकल्प दिये जाएँ

भोजपुरी रचना

[बी०ए०, बी० एससी० एवं बी० कॉम० (प्रतिष्ठा तथा सामान्य) के खातिर]  
द्वितीय पत्र(दोसरका पत्र)

समय- डेढ़ घंटे

पूर्णांक-50

अंक विभाजन -

1. पाठ्य पुस्तक से परिचयात्मक प्रश्न - 1	1×15= 15
2. हिन्दी गद्यांश से भोजपुरी में अनुवाद	1×15=15
3. संक्षेपण	1×10=10
3. व्याकरण	2×5 =10
	<u>50</u>

निर्धारित पाठ्य पुस्तक आ पाठ -

1. मास्टर गणेशी राम - नरेन्द्र रस्तोगी 'मशरक' (नाटक)
2. वचन, काल, पर्यायवाची शब्द, विपरीतार्थक शब्द, मुहावरा, लोकोक्ति।

निर्धारित सहायक ग्रन्थ -

1. भोजपुरी व्याकरण के रूप रेखा - विन्ध्याचल प्रसाद श्रीवास्तव
2. नाचे ना जाने अंगनवे टेढ़ - शारदानन्द प्रसाद
3. भोजपुरी शब्दानुशासन - डॉ० रसिक बिहारी ओझा 'निर्मिक'
4. आदर्श भोजपुरी व्याकरण - आचार्य श्रद्धानन्द अवधूत

छात्रों को पर्याप्त विकल्प दिये जाएँ

मैथिली रचना

द्वितीय पत्र

[बी०ए०, बी० एससी० एवं बी० कॉम० (प्रतिष्ठा तथा सामान्य) सभक हेतु]

समय- डेढ़ घंटे

पूर्णांक-50

पाठ्य पुस्तक 1. ललित गद्य - सम्पादक, डॉ० कृष्ण कुमार ठाकुर  
एवं डॉ० शिवशंकर झा "कान्त"

2. कथा पुष्प - सम्पादक, डॉ० देवेन्द्र झा

अंकों का विभाजन

पाठ्य पुस्तक सँ परिचयात्मक प्रश्न	12 अंक
पाठ्य पुस्तक सँ आशय	08 अंक
निबन्ध	20 अंक
व्याकरण ओ रचना	10 अंक

व्याकरण ओ रचना के लेल निर्धारित विषय : संधि, समास, कृदन्त, तद्धित, प्रत्यय, श्रुतिसम, भिन्नार्थक शब्द, अनेक शब्द लेल एक शब्द, मोहवरा।

छात्रों को पर्याप्त विकल्प दिये जाएँ

URDU COMPOSITION

Paper II

[ For B.A., B.Sc., B.Com. (General/Honours) courses ]

Time - 1½ hours

Full Marks - 50

**Book Prescribed**

Adabiyat (Poetry Portion only) by Dr. A. Wasey & Dr. Q. A. Hashmi

**Pieces Prescribed**

(i) Nazeer (ii) Hali (iii) Iqbal



**Division of Marks**

- |                                   |                 |
|-----------------------------------|-----------------|
| 1. Two questions of 15 marks each | 2×15 = 20 marks |
| 2. Grammer                        | 20 marks        |
- (Azdad, Jins, Khat Nigari and Mazmoon Nigari)

**BENGALI COMPOSITION****Paper II**

[ For B.A., B.Sc., B.Com. (General/Honours) courses ]

Time - 1½ hours

Full Marks - 50

**Books Prescribed :**

১। বিসর্জন : রবীন্দ্রনাথ

২। প্রভাতকুমারের ছেটিগল্প : প্রভাত কুমার মুখোপাধ্যায়

পাঠ্যগ্রন্থ : দেবী, কাশী বাসিনী, হসনময়ীর রসিকতা, মাতৃহীন, অযোধ্যার  
ঊপহার, বিবাহের বিজ্ঞাপন।

**Division of Marks**

- |                      |                 |
|----------------------|-----------------|
| Critical Questions   | 10×2 = 20 marks |
| Explanations         | 5×2 = 10 marks  |
| Unseen amplification |                 |
| Prose piece          | 1×10= 10 marks  |
| Essay                | 1×10= 10 marks  |

**ENGLISH COMPOSITION****Paper II**

[ For B.A., B.Sc., B.Com. (General/Honours) courses ]

Time - 1½ hours

Full Marks - 50

**Books Prescribed (Rapid Reader)**

The Merchant of Venice by Shakespeare

**Division of Marks :**

- |                              |          |
|------------------------------|----------|
| 1. Rapid Reading             | 20 marks |
| 2. An Essay on Current Topic | 20 marks |
| 3. Letter writing            | 10 marks |

## COURSES OF STUDY

for

**B.Sc. (General) PART II Examination**

(See page no. 1 for compulsory subjects)

**Optional Subjects for B.Sc.(General) Part II Examination**

### **PHYSICS (GENERAL)**

#### **Paper II**

**Time - 3 hours**

**Full Marks - 75**

Twelve questions to be set. Six to be answered (at least Two from Group A, Two from Group B and Two from Group C)

#### **Group A**

##### **Optics (Four questions to be set)**

General theory of image formation : Cardinal points of an optical system, general relationship, thick lens and lens combinations.

Interference of light : Division of wavefront and division of amplitude, Michelson Interferometer.

Fresnel diffraction : Half-period zones, straight edge, explanation of rectilinear propagation of light

Fraunhofer diffraction : Diffraction at a slit.

Diffraction at N Parallel slits; plane diffraction grating.

Rayleigh criterion, resolving power of telescope.

Dispersion and Scattering : Theory of dispersion of light, absorption bands and anomalous dispersion, Theory of Rayleigh Scattering.

Purity of a spectral line, coherence length and coherence time,

Einstein's A and B coefficients, coherence of induced emissions,

Conditions for laser action, population inversion, Ruby Laser, He-Ne Laser.

#### **Group B**

##### **Electricity and Magnetism (Two questions to be set)**

Electric Field : Field due to quadrupole. Torque on a dipole in nonuniform fields

Potential energy of a system of charges.

Diamagnetism, Paramagnetism due to free ions and conduction electrons, concept of domains and Ferromagnetism, Langevin's and Weiss theories, Curie's Law.

### Group C

#### Current Electricity & Modern Physics (Four questions to be set)

Alternating Currents : Skin effect for resistance at high frequencies; complex impedance, reactance, impedances of LCR series and parallel circuits, resonance, Q factor, Power dissipation and Power factor, A.C. Bridges : Anderson's and DeSauty bridges.

Nuclear Models : Liquid drop model and mass formula, The shell model.

Radioactivity : Decay constant and half-life; Beta-decay, Fermi's theory, neutrino and anti-neutrino

Accelerators : Need for accelerators; cyclic accelerators, cyclotron, synchrocyclotron, quark hypothesis.

### PHYSICS (GENERAL)

#### Practical

(One experiment to be performed in examination

(Expt.- 15, viva-6, NB- 4)

**Time - 3 hours**

**Full Marks - 25**

The course shall include the following experiments :

1. Study of characteristics of a Ballastic galvanometer.
2. Study of magnetic field using a vibration magnometer.
3. Obtaining the B-H curve of a ferromagnetic material (any method)
4. Low resistance measurement, C.F. Bridge or any other method.
5. Study of NAND and NOR circuits (discrete and integrated circuits)
6. Using an AC bridge to measure L or C.
7. Use of Newton's ring to determine the radii of curvature of surfaces

**CHEMISTRY (GENERAL)****Paper II**

Time - 3 hours

Full Marks - 75

Twelve questions to be set. Six to be answered (at least Two from Group A, Two from Group B and Two from Group C)

**Group A****Physical Chemistry**

1. **Chemical Kinetics** - Rate of reaction, order and molecularity of reaction, first and second order, derivation of rate constant, methods of determining order reaction, half life and its unit.
2. **Cell** : Reversible electrodes and cells, electrode potential oxidation-reduction potential, criteria of chemical reaction with reference to electrode potential and e.m.f simple idea about concentration cell (without transference) and their e.m.f.
3. **Phase Equilibria**-Phase, component and degree of freedom, one component system, water and sulphur system, Triple point, heating and cooling curves.
4. **ElectroChemistry** - Conductivity and its measurements specific conductance, Equivalent conductance and molar conductance, Kohlrausch's law, Variation of conductivity with dilution, ionic conductance transport number and its measurements, application of conductance measurements.
5. **Ionic equilibria** : Ostwald's dilution law, ionic product of water. Modern concepts of acids and base. Solubility products, applications of solubility products principles, hydrolysis constants, pH, buffer solutions, acid-base indicators.

**Group B****Organic Chemistry**

1. A brief idea of substitution, addition and elimination reaction including mechanism of nitration, sulphonation and halogenation.
2. **Stereo isomerism** : Optical activity, optical isomerism of lactic and tartaric and racemic and meso form, resolution, Geometrical isomerism of maleic acid and fumaric acid.

3. **Hydroxy acid** : Preparation and properties of lactic, tartaric and citric acid.
4. **Carbohydrate**: Definition and classification, conversion of glucose into fructose and reverse. Ascending and descending the series of monosaccharide openchain structure of glucose and fructos & Mutarotation.
5. **Benzene** : Aromaticity, Orientation, Idea of ortho and para orienting groups.

#### **Preparation and properties of**

(a) Nitrobenzene (b) Aniline (c) Benzene diazonium chloride, phenol, benzaldehyde and benzoic acid

#### *A brief idea of*

- i. Friedel Craft's reaction
- ii. Sandmayer's reaction
- iii. Cannizzaro's reaction
- iv. Perkin's reaction
- v. Kolbe's reaction
6. Active methyle compounds

Active methyle groups, keto enol tautomerism, preparation and properties of ethylaceto acetate and malonic ester.

### **Group C**

#### **Inorganic Chemistry**

1. **Chemical bonding** : Directional character of covalent bond, resonance, hybridisation and bonds structure and shape of molecules of the type  $AB_2$ ,  $AB_3$ ,  $AB_4$ ,  $AB_5$ ,  $AB_6$ , and  $AB_7$ , M.O. diagram for diatomic systems, bond order, bond length and bond energy, dipolemoment and percentage ionic character, hydrogen bond.
2. **Radioactivity** :  $\alpha$ ,  $\beta$  &  $\gamma$  rays, group displacement law, isotope, isobars and isotones, induced radioactivity, balancing of nuclear equation, natural radiocative series.
3. **Group studies** : Boron: Boronhalides, Boronhydrides, Boric acid and Borates, Borazole, chemistry of Borax bead test.

**Nitrogen family** : Hydrazine, Hydrazoic acid, Oxides and Oxyacids of phosphorus, analytical tests for nitrate and phosphate, nitrogenous and phosphatic fertilizers.

**Sulphur family** : Halides and Oxyacids of sulphur, selenium and tellurium, Peracids of Sulphur, Sodium thiosulphate.

4. General characteristics of transition and nontransition elements : Stability of different oxidation states, variation of atomic and ionic radii, acid, base behaviour of oxides, hydrolysis and amphoterism of compound, magnetic properties and complex formation.
5. **Co-ordination compounds** : Double salts and complex compounds, Werner's theory, co-ordination number, ligands and their classification, isomerism in complexes, Sidgwick EAN rule, valance bond model and inner and outer orbital complexes, inner complexes, application of complex compounds in qualitative analysis.

### Books Recommended

1. Physical Chemistry by **P. C. Rakshit**
2. Advance Physical Chemistry by **Bahl and Bahl**
3. Physical Chemistry through Problems by **S. K. Dogra & S. Dogra**
4. Inorganic Chemistry by **Puri, Sharma and Jauhar**
5. Inorganic Chemistry by **T. Sharma**
6. Inorganic Chemistry by **Huhee**
7. Organic Chemistry by **M. K. Jain**
8. Modern Organic Chemistry by **I. L. Finar**
9. Advance Organic Chemistry by **B. S. Bahl & Arun Bahl**

### CHEMISTRY (GENERAL)

#### Practical

Time - 3 hours

Full Marks - 25

- |  |          |
|--|----------|
| 1. Volumetric analysis   | 10 marks |
| Use of $\text{KMnO}_4$ , $\text{K}_2\text{Cr}_2\text{O}_7$ , Oxalic and sodiumthiosulphate |          |
| 2. Organic group detection   | 10 marks |
| 3. Viva -voce and Note-Book  | 5 marks  |

**MATHEMATICS (GENERAL)****Paper II****(Calculus and Analytical Geometry)****Time - 3 hours****Full Marks - 100**

Twelve questions to be set. Six to be answered selecting at least one from each group.

**Group A****Differential Calculus (Three questions)**

Successive differentiation, Leibnitz theorem, Statement of Taylor's series and Maclaurin's series, Expansion using them, Partial derivatives, Euler's theorem, Exact differential, Tangents and Normals, Sub-tangent, Sub-normal, Polar sub-tangent, Polar sub-normal, Intrinsic and Pedal equations, Curvature, Asymptotes.

**Group B****Integral Calculus (Three questions)**

Integration of rational functions, Definite integral as limit of a sum, Reduction formula, Rectification and quadrature, Surface and volume of solids of revolution, Moment of inertia, Centre of gravity.

**Group C****Analytical Geometry of two dimension(Three questions)**

System of circles, Coaxial circles, Change of axis, Standard equations of parabola, ellipse and hyperbola, Condition for the general equation of the second degree to represent parabola, ellipse and hyperbola and reduction into standard form, Equations of tangent and normal in case of general equations (using Calculus) and their forms in case of particular conic section.

**Analytical Geometry of three dimensions (Three questions)**

Rectangular, Spherical, Polar and Cylindrical co-ordinates, Direction cosines, Angle between straight lines, Equations of planes and straight lines, shortest distance between lines, Coplaner lines, Equations of sphere and cylinder.

**Books Recommended**

1. Differential Calculus by **Das Gupta**
2. Integral Calculus by **Das and Mukherjee**
3. Analytical Geometry of two dimensions by **S. L. Loney**
4. Analytical Geometry of three dimensions by **Shanti Narayan**
5. Differential Calculus by **J. Edwards**
6. Differential Calculus by **Laljee Prasad**
7. Integral Calculus by **Benjamin Williamson**
8. Integral Calculus by **Laljee Prasad**
9. Analytical Geometry of two dimensions by **E. H. ASKWITH**
10. Analytical Geometry of three dimensions by **J. T. Bell**



**BOTANY (GENERAL)****Paper II****Time - 3 hours****Full Marks - 75**

Ten questions to be set, five from each group. Candidates are required to answer five questions attempting at least two questions from each group.

**Group A****1. Taxonomy**

- i. Classification of angiosperm with reference to Linnaeus, Bentham and Hooker, Engler and Prantl and Hutchinson system.
- ii. Diagnostic feature and economic importance of the following families -  
*Ranunculaceae, Caryophyllaceae, Cucurbitaceae, Convolvulaceae, Scrophulariaceae, Acanthaceae, Lamiaceae, Euphorbiaceae, Musaceae* and *Cyperaceae*,

**2. Anatomy**

- i. Meristem
- ii. Root stem transitions
- iii. Anomalous Secondary growth  
*Boerhaavia, Nyctanthes, Bignonia, Tinospora, Dracaena*
- iv. Periderm - Structure, origin and function.

**Group B****3. Embryology**

- i. Micro and Megasporogenesis
- ii. Micro and Megagametogenesis
- iii. Endosperm
- iv. Embryogeny

**4. Cytogenetics**

- i. Cell Structure
- ii. Cell divisions - Mitosis and Meiosis
- iii. Mendelism
- iv. Morphology of chromosome
- v. DNA and RNA - Structure and replication
- vi. A brief knowledge of Linkage, Crossing over, Polyploidy, Mutation, Genetic code and Genetic engineering.

## Books Recommended

1. Principles of Angiosperm (Taxonomy) by V. H. Heywood
2. Systematic Botany by R. C. Mathur
3. Plant Taxonomy by Eames and MacDaniel
4. Plant Anatomy by B. P. Pandey
5. Embryology of Angiosperm by Bhojwani and Bhatnagar
6. Genetics by M. W. Strickberger
7. Cytology, Genetics and Evolution by P. K. Gupta

## BOTANY(GENERAL)

## Practical

Time - 3 hours

Full Marks - 25

1. Plant discription in semitechnical terms and identification upto family 7 marks
2. Temporary slide preparation, sketches and characteristic feature of given anatomical material. 5 marks
3. Identification and comment upon the given spots 4 marks
  - a. Anatomy 1 mark
  - b. Embryology 1 mark
  - c. Cytology 1 mark
  - d. Morphology 1 mark
4. Practical Record 5 marks
5. Viva-voce 4 marks

**15**  
**ZOOLOGY (GENERAL)**

**Paper II**

**Time - 3 hours**

**Full Marks - 75**

Five questions are to be set from each group. Students shall answer any five questions in all, attempting not more than three from each group.

**Group A**

**Chordata**

1. **Bionomics : General characters and classification (upto orders only) of living Chordates of the following groups :-**  
Protochordata, Cyclostomata, Pisces, Amphibia, Reptilia, Aves and Mammalia.
2. **Study of the following :-**
  - i. Urochordata-*Herdmania* (including Retrogressive metamorphosis)
  - ii. Cephalochordata - *Amphioxus*
  - iii. Pisces - *Scolodon* - Type study : differences with that of a Bony fish.
  - iv. Reptilia - Biting and feeding mechanism of snakes.
  - v. Aves -*Columba* :  
Flight adaptations, Elementary idea of bird migration and Bird Sanctuaries in India.
  - vi. Mammalia - Characters, distribution and affinity of Prototheria and Metatheria.
3. **Comparative study of the following in Vertebrates :**  
Integument, Heart, Aortic arches and Brain.

**Group B**

1. **Embryology :**
  - i. Types of vertebrate eggs and their early cleavage.
  - ii. Development of *Amphioxus* (upto the formation of coelom) and Chick (upto 3 germinal layers)
  - iii. Placenta in Mammals - Its development, types and functions.
2. **Biochemistry, Physiology and Endocrinology :**
  - i. Structure and classification of Proteins, Carbohydrates & Fats
  - ii. Physiology of Digestion, Excretion & Respiration in Mammals.

Islets of Langerhans, Testis, Ovary, Thyroid, Adrenal & Pituitary

### Books Recommended

1. Modern Text Book of Vertebrates By **R. L. Kotpal**
2. Chordate Zoology and Animal Physiology by **E. L. Jordan** and **P. S. Verma**
3. Chordate Embryology by **Verma, Agarwal** and **Tyagi**
4. A Text Book of Animal Physiology by **Goel** and **Shastri**
5. A Text Book of Animal Physiology by **A. K. Berry**
6. Human Physiology Vol. II by **Chatterjee**

### ZOOLOGY (GENERAL)

#### Practical

Time - 3 hours

Full Marks - 25

1. **Dissection** 1×7=7 marks  
*Scoliodon* - Afferent and efferent branchial arteries, Cranial nerves (V and VII) and (IX and X), Internal ear, Eye muscles and their nerves supply, Urinogenital system.  
*Columba* - Flight muscles, Arterial and Venous systems.
2. **Mounting (Permanent stained preparation)** 1×4=4 marks  
 Scales of fishes, Pecten and Filoplume feather of birds, Ampulla of Lorenziini.
3. **Spotting** 1×6=6 marks  
 Museum Specimen 1 mark  
 Bones 3 marks  
 (Limb, Girdle, Skull, Vertebrae of Varanus and Fowl)  
 Slides 2 marks
4. **Endocrinology and Embryology** 2×2=4 marks  
 i. Identification of permanent slides of the various developmental stages of Frog and Chick.  
 ii. Identification and comment upon the histological structure of various Endocrine glands.
5. **Practical Records** 4 marks

**COURSES OF STUDY**

for

**B.Sc. (Honours) Part II Examination  
PHYSICS (HONOURS)****Paper III****( OPTICS )****Time - 3 hours****Full Marks - 75**

Twelve questions to be set. Six to be answered (taking atleast two from each group)

**Group A****Geometrical Optics (Two questions to be set)**

Fermat's Principle : Principle of extremum path; the aplanatic points of a sphere and other applications.

General Theory of Image formation : Cardinal Points of an optical system; general relationship, thick lens and lens combinations.

**Group B****Physical Optics (Eight question to be set)**

Interference of light : Division of wavefront and division of amplitude, Michelson Interferometer, Fabry - Perot Interferometer and etalon.

Fresnel diffraction : Half - period zones, circular apertures and obstacles, straight edge, explanation of rectilinear propagation of light.

Fraunhofer diffraction : Diffraction at a slit, a circular aperture.

Diffraction grating : Diffraction at N parallel slits; plane diffraction grating.

Resolution of images : Rayleigh criterion, resolving power of a telescope, microscope, grating and prism.

Double Refraction and optical rotation : Double refraction in uniaxial crystals, explanation in terms of electromagnetic theory, phase retardation plates, Rotation of plane of polarisation, origin of optical rotation in liquids and in crystals.

Dispersion and Scattering : Theory of dispersion of light; absorption bands

and anomalous dispersion. Theory of Rayleigh Scattering.

### Group C

#### Laser System (Two questions to be set)

Purity of Spectral Line : Coherence length and coherence time, Spatial coherence of a source, Einstein's A and B Coefficients; coherence of induced emissions, Conditions for laser action, existence of a meta-stable state, population inversion by pumping and cavity, Ruby Laser, He-Ne Laser.

#### Books Recommended :-

1. A. K. GHATAK - "Physical Optics".
2. D. P. Khandelwal - Optics and Atomic Physics , (Himalaya Publishing House, Bombay, 1988)
3. Jenkins and White - "Fundamentals of Optics" (McGraw-Hill)
4. B. K. Mathur - "Optics".
5. P. K. Srivastava - "Optics"

## PHYSICS (HONOURS)

### Paper IV

(Electrostatics, Magnetism, Current Electricity & Atomic Physics)

Time - 3 hours

Full Marks - 75

Twelve questions to be set. Six to be answered (taking atleast two from each group)

### Group A

#### Electrostatics and Magnetism (Two questions to be set)

Electric Field : Field due to quadrupole, Torque on a dipole in non-uniform fields.

Electric Potential : Potential energy of a system of charges, Poisson's equation, Laplace's equation, Boundary conditions and uniqueness theorems.

Diamagnetism, Paramagnetism due to free ions and conduction electrons; Concept of Domains and Ferromagnetism, Langevin's and Weiss theories, Curie's Law, Hysteresis loop, Energy loss per cycle of magnetisation, Simple idea of anti-ferro and ferimagnetism, Ferrites.

**Group B****Current Electricity (Four questions to be set)**

Varying Current : Rise and decay of currents in LR and CR circuits, Time constant, Integrating and differentiating circuits.

Alternating Current : Skin effect for resistance at high frequencies; Complex impedance, Reactance, Impedances of LCR series and parallel circuits, resonance, Q factor, Power dissipation and Power factor, A.C. bridges, Anderson's and Owen's bridges, Rotating magnetic field, Polyphase and single phase induction motors.

**Group C****Nuclear & Particle Physics (Six questions to be set)**

Nuclear Models : Liquid drop model and mass formula, the shell model.

Radioactivity : Decay constant and half-life, Beta-decay, Fermi's theory, Neutrino and anti-neutrino.

Artificial radioactivity : Nuclear fission, Neutron reaction, Fermi and transuranic elements, Chain reaction, Criticality, Moderators, Nuclear Fusion.

Accelerators : Need for accelerators; Cyclic accelerators, Cyclotron, Synchrocyclotron, variable energy cyclotron, Phase stability.

Cosmics rays : Primary and secondary cosmic rays, Hard and soft components, cosmic ray showers, Effect of earth's magnetic field on cosmic ray trajectories, Resonant Particles-discovery and important properties, Strangeness, conservation of strangeness in particle interactions, quark hypothesis.

**Books Recommended :-**

1. **A. S. Mahajan and A. A. Rangwala** - "Electricity and Magnetism (Tata Mcgraw Hill)
2. **Kaplan** - "Nuclear Physics"
3. **Cohen** - "Concept of Nuclear Physics"
4. **Segree** - "Nuclei and Particles"

5. **Rossi - "Cosmic Rays"****PHYSICS (HONOURS)****Practical**

(One experiment to be performed in examination)

**Time - 6 hours****Full Marks -50**

(Expt.- 30, viva-12, NB- 8)

The course shall include the following experiments:-

1. Study of characteristics of a Ballistic galvanometer through discharge of Condensor.
2. Study of magnetic field using a vibration magnetometer.
3. Obtaining the B-H curve of a ferromagnetic material (any method)
4. Low resistance measurement; (i) C.F. Bridge (2) Wheat Stone's bridge.
5. Response curve for LCR circuits, series resonances
6. Measurement of L using Anderson's bridge.
7. Measurement of C using Scheering bridge.
8. Study of NAND and NOR circuits (discrete and integrated circuits)
9. Dispersive power of material and linear dispersion in a prism spectrum using a graticule in the eyepiece.
10. Use of Newton's rings to determine the radii of curvature of surfaces.
11. Resolving limit of the eye and a telescope with a variable aperture
12. Study the spectra produced by a plane transmission grating using (a) minimum deviation setting and (b) first order spectra for two wavelengths.



**CHEMISTRY (HONOURS)****Paper III**

Time - 3 hours

Full Marks - 75

Ten questions to be set. Five questions to be answered selecting two from group A (Physical Chemistry) and three from group B (Organic Chemistry). Short answer type questions are recommended. There may be several parts in a question.

**Group A****PHYSICAL CHEMISTRY**

The syllabus consists of following units :-

Marks - 25

**UNIT - I**

10 Hrs

**QUANTUM CHEMISTRY**

Black body radiation, Plank's quantum theory, Wave particle quality, de Broglie equation, Heisenberg uncertainty principle and its importance.

**Motion of Vibrating String**

Postulates of quantum mechanics, Eigen function, Eigen value, Properties of wave function, Orthogonality, Normalisation of wave function, Schrodinger wave equation.

**UNIT - II**

12 Hrs

**ELECTRO CHEMISTRY**

- (a) Ostwald dilution law, Its application, Buffer solution, Buffer action, Henderson-Hassel equation, Hydrolysis of salts, Relation between  $K_h$ ,  $K_w$ ,  $K_a$  and  $K_b$ ,  $P^H$  of hydrolysed salt solution, Acid base indicators, Solubility product, Common Ion effect.
- (b) Galvanic cell, Reversible and Irreversible cells, Electrodes, Types of Electrodes, Reference electrodes, H, Calomei, Glass and quinhydrone electrodes.

**UNIT - III****DISTRIBUTION LAW**

Distribution law, its Thermodynamic derivation and limitations, Modification in law for association, dissociation and solvent participation, Applications.

Complex formation between KI and  $I_2$ ,  $CuSO_4$  and  $NH_3$ , Solvent Extraction

## UNIT - II

### INTERFACE CHEMISTRY

Adsorption, Sorption, Desorption, Kinds of adsorption Isotherms, Adsorption of gases on solids, Freundlich adsorption Isotherm, Langmuir's Isotherm, B.E.T. equation (qualitative only)

### Group B

### INORGANIC CHEMISTRY

The syllabus consists of following units :-

**Marks - 50**

#### UNIT - I

6 Hrs

#### NATURE OF CHEMICAL BOND

Overlapping of atomic orbitals

$\delta$ ,  $\pi$ , Tau and delta bond. Bonding in  $B_2H_6$ . Copper (II) acetate and Chromous acetate.

Concept of resonance and delocalisation of orbitals. e.g.  $NO$ ,  $NO_2^-$ ,  $SO_2$ ,  $SO_3$ ,  $SO_4^{2-}$ ,  $PO_4^{3-}$  &  $CO_3^{2-}$  ions.

#### UNIT - II

10 Hrs

#### CHEMISTRY OF ELEMENTS OF FIRST TRANSITION SERIES

Characteristic of d-Block elements.

General study of the elements of First Transition series and their binary compounds, Complex formation in different O-states. C.N. and geometry, Principles behind volumetric estimation of  $Cu^{+2}$ ,  $Fe^{+2}$ , Ions by the use of std. Sodium thiosulphate,  $KMnO_4$  and  $K_2Cr_2O_7$  solution.

#### UNIT - III

10 Hrs

#### CHEMISTRY OF ELEMENTS OF SECOND TRANSITION SERIES

General characteristics, Comparative treatment with their 3d-analogues, in respect of Ionic radii, O-states, Magnetic behaviour of compounds, complex forming tendencies and stereo chemistry.

Ores and extraction of V & Mo.

## UNIT - IV

## NON-AQUEOUS SOLVENTS

Types of solvents and their general characteristics. Reactions in non-aqueous solvents such as Liq.  $\text{NH}_3$  and Liq.  $\text{SO}_2$ .

## UNIT - V

10 Hrs

## CO-ORDINATION COMPOUNDS

Double salts and complex compounds, Werner's co-ordination theory and its justification from physical data, Isomerism in complexes, Effective atomic no. concept, Chelates, V.B. Theory of complexes, Nomenclature of complex compounds.

## UNIT - VI

4 Hrs

## LANTHANIDES

Electronic configuration, O-States, Ionic radii and Lanthanide contraction, Complex formation, Separation of Lanthanides, Ions exchange method.

## UNIT - VII

4 Hrs

## MOLECULAR SYMMETRY

Symmetry Introduction : Symmetry elements and Symmetry operation. Centre of Symmetry, Axis of symmetry and plane of symmetry.

## CHEMISTRY (HONOURS)

## Paper IV

Time - 3 hours

Full Marks - 75

Ten questions to be set. Five questions to be answered selecting two from group A (Physical Chemistry) and three from group B (Organic Chemistry). Short answer type questions are recommended. There may be several parts in a question.

## Group A

## PHYSICAL CHEMISTRY

The syllabus consists of following units :-

Marks - 25

## UNIT - I

10 Hrs

**CHEMICAL THERMODYNAMICS**

Spontaneous Processes, 2nd law of thermodynamics Carnot cycle and its efficiency, Clausius inequality, Entropy, Physical concepts of entropy, changes in reversible and Irreversible processes and universe.  $\Delta S$  in mixture of gases. The variation of entropy with temp. Nernst heat theorem, 3rd law of the thermodynamics and its applications.

**UNIT - II****CHEMICAL KINETICS**

Order and molecularity of reaction, Kinetics of Zero, 1st and 2nd order reactions. Their half life and Mean life, Methods of determination of order of reactions.

Effect of temp. on rates of reaction, Temp. Coefficient, Arrhenius equation, concept of activated state and energy of activation, P.E. diagram, Catalysis, Characteristics, Classification and theories of Catalysis, Promoters, Inhibitors, Catalytic poison, auto-catalysis, Enzyme catalysis and its kinetics, Michaelis Mentum equation.

**UNIT - III****PHASE EQUILIBRIA**

Two component systems

Solid liquid equilibrium

Simple eutectic system.

Ag-Pb system, Desilverisation of lead.

**Solid Solutions**

Compound formation with congruent melting point (Mg-Zn system) and incongruent melting point (FeCl<sub>3</sub>-H<sub>2</sub>O & CuSO<sub>4</sub>-H<sub>2</sub>O system).

**UNIT - IV**

4 Hrs

**PHOTO CHEMISTRY**

Interaction of radiation with matter, Thermal and photo chemical processes. Laws of photochemistry

Grothus-Draper Law.

Stark Einstein Law.

Quantum Yield.

**ORGANIC CHEMISTRY**

The syllabus consists of following units :-

**Marks - 50**

**UNIT - I**

10 Hrs

**STEREO CHEMISTRY**

(a) **Optical Isomerism** :- Molecular chirality, Optical activity, Enantiomerism and diastereomerism involving one and two chiral centres, Meso compounds, Racemic mixture, Racemisation, Resolution of racemic mixture, Threo and erythro diastereomers, Relative and absolute configurations, Sequence rules, D.L. and R.S. systems of nomenclature.

**UNIT - II**

8 Hrs

**REACTIONS OF SYNTHETIC IMPORTANCE**

Definition, Mechanism, Applications and limitations (if any) of following name reactions :-

- a. Aldol Condensation
- b. Cannizzaro Reaction
- c. Claisen Condensation
- d. Knoevenagel Reaction
- e. Parkin's Reaction
- f. Reformatsky Reaction
- g. Reimer-Tiemann Reaction
- h. Wolf-Kishner reduction

**UNIT - III**

12 Hrs

**AROMATIC CHEMISTRY**

Aromaticity, Huckel's rule, Aromatic, non-aromatic and anti-aromatic species, resonance, Aromatic electrophilic substitution, Mechanism of nitration, Halogenation, Sulphonation and Friedel-Craft's reaction, Effects of substituents on reactivity and orientation, Synthesis and properties of monofunctional derivatives of benzene eg. amines, Phenols, Sulphonic acid, Aldehyde, Ketone and nitro derivatives, Diazonium salts and its synthetic importance.

## UNIT - IV

8 Hrs

## ACTIVE METHYLENE COMPOUNDS

Systems with acidic-Hydrogens.

Keto-enol tautomerism, Preparation and synthetic applications of ethyl acetoacetate and diethyl malonate.

## UNIT - V

10 Hrs

## CARBOXYLIC ACIDS

Types of hydroxy acids (eg.  $\alpha$ ,  $\beta$ ,  $\gamma$ ), general methods of preparation and properties of hydroxy acids with reference to lactic, Tartaric and citric acids, Structure of citric acid.

Preparation and properties of unsaturated monocarboxylic acids and dicarboxylic acids, Effect of heat and dehydrating agents on dicarboxylic acids.

## UNIT - VI

12 Hrs

## CARBOHYDRATE CHEMISTRY

Classification and nomenclature, Open chain structures of glucose and fructose, Mechanism of osazone formation, Interconversion of glucose and fructose, Chain lengthening and chain shortening of aldoses, Configuration of D-glucose and fructose, Cyclic structure of D-glucose, Mechanism of mutarotation.

## CHEMISTRY (HONOURS)

## PRACTICAL

Time - 6 hours

Full Marks 50

1. (a) (i) Preparation and standardisation of  $\text{KMnO}_4$  and  $\text{Na}_2\text{S}_2\text{O}_3$ .  
 (ii) Estimation of  $\text{Fe}^{+2}$  by  $\text{KMnO}_4$  and  $\text{K}_2\text{Cr}_2\text{O}_7$ .  
 (iii) Estimation of  $\text{Cu}^{+2}$  using thiosulphate.
- (b) Gravimetric analysis
  - (i) Estimation of  $\text{Ba}^{+2}$  as  $\text{BaSO}_4$ .
  - (ii) Estimation of  $\text{Ni}^{+2}$  as Nickel dimethyl glyoximate.

**MATHEMATICS (HONOURS)****Paper III**

Time - 3 hours

Full Marks - 100

Twelve questions to be set. Six to be answered selecting at least one from each group.

**Group A****ADVANCE CALCULUS (Six questions)**

Continuity, Sequential continuity, Properties of continuous functions, Uniform continuity, Chain rule of differentiability, Mean value theorems and their geometrical interpretations, Darboux's intermediate value theorem for derivative, Taylor's theorem with various forms of remainders. Limit and continuity of functions of two variables, Partial differentiation, Change of variables, Euler's theorem on homogeneous functions, Taylor's theorem for functions of two variables, Jacobians, Envelopes, Evolutes, Maxima, Minima and saddle points of function of two variables, Lagrangian multiplier method, Indeterminate forms, Tests for concavity and convexity, Points of inflexion, Multiple points,

**Group B****INFINITE SERIES (Three questions)**

Definition of sequence, Theorem on limit of sequences, Bounded and monotonic sequences, Cauchy's convergence Criterion, Series of non-negative terms, Comparison tests, Cauchy's integral test, Ratio tests, Raabes, Logarithmic, De-Morgan and Bertrand's tests, Alternating series, Leibnitz's theorem, Absolute and Conditional convergence.

**Group C****VECTOR ANALYSIS (Three questions)**

Scalar and Vector product of three vectors, Reciprocal Vectors, Vector differentiation, Gradient, Divergence and Curl, Vector integration, Theorem of Gauss, Green, Stokes and problems based on them.

**References :-**

1. T. M. Apostol - Mathematical Analysis, Narosa Publishing House, New Delhi
2. D. Soma Sundaram - A first course in Mathematical Analysis, & B. Chaudhary - Narosa Publishing House, New Delhi. 1997
3. P.K. Jain and S.K. Kaushik - An introduction to real Analysis, S. Chand & Co.

4. Murray R. Spiegel - Theorem and Problem of Advance Calculus, Schaum Publishing Co., New York
5. Earl D. Rainville - Infinite Series, Macmillan Company, New York
6. S. C. Malik - Mathematical Analysis, Wiley Bastem Ltd., New Delhi
7. Laljee Prasad - Infinite Series
8. A. R. Vasistha - Infinite Series
9. K. K. Jha - Advance Real Analysis, NavBharat Prakashan
10. Murray R. Spiegel - Vector Analysis, Schaum Publishing Co. N.York
11. N. Sharan and S.N. Nigam - Introdustion Vector Analysis, Pothishala Pvt. Ltd., Allahabad
12. Shanti Narayan - A text book of Vector Calculus, S. Chand & Co., New Delhi
13. Shanti Narayan - A Course of Mathematical Analysis, S. Chand & Co., New Delhi
14. Gorakh Prasad - Differential Calculus, Pothishala Pvt.Ltd., Allahabad

### MATHEMATICS (HONOURS)

#### Paper IV

**Time - 3 hours**

**Full Marks - 100**

Twelve questions to be set. Six to be answered selecting at least one from each group.

#### Group A

#### ORDINARY DIFFERENTIAL EQUATION (Five questions)

Linear Differential equation of second order, Transformation of the equation by changing the dependent variable/Independent variable, Method of variation of parameters, Ordinary simultaneous differential equation, Series solutions of differential equations, Power series method, Bessel, Legendre and Hydpergeometric functions and their properties, Convergence, Recurrence and generating relations, Orthogonality of functions, Strum-Liouville problem, Orthogonality of Eigen Functions, Reality Eigen values, Othogonality of Bessel functions and Legendre polynomilas, Laplace transformation-Linearity of the Laplace transformation of derivatives and integrals, Shifting theorems, differentiation and integration of transforms, Convolution theorem, Solution of integral equations and system of differential equations using Laplace transformation.



**Group B****Partial Differentiation Equation (Four questions)**

Partial differentiation equations of the first order, Lagranges solution, Some special types of equations which can be solved easily by methods, Other than the general method, Charpits general method of solution, Partial differentiation equation of second and higher order classification of linear differential equations of second order.

**Group C****CALCULUS VARIATION (Four questions)**

Variational problems with fixed boundries- Euler's equation for functionals containing first order derivatives and one independent variables, Extremals, Functional dependent on higher order derivatives, Functionals dependent on more than one dependent variable, Variable problems in parametric form invariance of Euler's equations under coordinates transformation.

**References :-**

1. D. A. Murray - Introductory course on differential equation, Orient Lingmann (India) 1967
2. Frank Ayres - Theory and Problem of differential equations, McGraw Hill Book Co., 1972
3. Gorakh Prasad - Differential Equations - Pothishala Pvt. Ltd., Allahabad
4. G. F. Simmons - Differential Equations, Tata McGraw Hill
5. F. A. Codington - An introduction to ordinary Differential Equations
6. Jane Crowin - Differential Equations, Marcel Dekhar, 1994
7. A. S. Gupta - Calculus of variation with applications, Prentice Hall of India, 1997
8. R. Courant and D. Hilbet - Methods of Mathematical Physics, Vol I & II, Wiky Interference, 1993
9. Richard Born - Theory of Problem of Differential Equations McGraw Hill India, 1997
10. A. M. Arthurs - Complementary Variations Principles, Clavendon Press Oxford, 1970
11. J. T. Oden and J. N. Reddy - Variational Methads in Theoretica Mechanics, Springer-Verlag, 1976
12. I. M. Gelfand and S. V. Famin - Calculus of Variation, prentice-Hill, Engle-Word Cliff (New Jersoy), 1963

**BOTANY (HONOURS)****Paper III****Time - 3 hours****Full Marks - 75**

Ten questions to be set. (Four questions from Group A and Five from Group B). Two questions to be answered from each group. Question No. 1 will be of objective type and compulsory.

**Group A**

1. **Plant water relations :**
  - (i) Osmosis & Diffusion; water potential and chemical potential
  - (ii) Absorption of water
  - (iii) Water transport through tracheids and vessels
  - (v) Transpiration and its significance, Mechanism of stomatal movement, Factors affecting transpiration
2. **Mineral Nutrition :**
  - (i) Criteria of essentiality of elements, macro & micro nutrient
  - (ii) Role of essential elements
  - (iii) Mineral deficiency symptoms and plant disorders
  - (iv) Nutrient uptake and transport mechanisms, Role of cell membranes, Ion pumps and carriers in transport of nutrients.
3. **Photosynthesis :**
  - (i) Historical background and significance; Photosynthetic pigments; Accessory pigments and the photoprotective carotenoids
  - (ii) Reaction centre complexes; Photochemical reactions; Photophosphorylation
  - (iii) Calvin cycle and Hatch & Slack pathway, CAM
4. **Transport of Organic Substances :**
  - (i) Transport of photosynthates; source sink relationship
  - (ii) The mechanism of translocation in phloem
5. **Respiration :**
  - (i) Glycolysis and TCA cycle and its regulation
  - (ii) Electron transport in mitochondria
  - (iii) Oxidative phosphorylation
  - (iv) Pentose phosphate pathway and cyanide-resistant respiration.
6. **Nitrogen Metabolism :**
  - (i) Biological  $N_2$ -fixation; reduction of  $N_2$  into ammonia

- (ii) Nif gene
- (iii) Regulation of nitrate reductase and nitrogenase
- (iv) Nitrate and ammonium assimilation

7. **Growth and Development :**

- (i) General aspects, Definition, Phase of growth, Kinetics of growth
- (ii) Physiology of seed dormancy and seed germination
- (iii) Concept of photoperiodism, Physiology of flowering, the florigen concept and role of hormones.
- (iv) Senescence and fruit ripening importance of respiratory climacteric

8. **Growth Hormones :**

- (i) Discovery, Physiological role and mechanism of the phytohormones; Auxins, Cytokinins, Gibberellines, Abscisic acid and Ethylene.
- (ii) Photomorphogenesis; Discovery of phytochromes and cryptochromes; their role and mechanism of actions.
- (iii) Signal transduction - basic concept
- (iv) Plant movements - tropic and nastic, biological clocks.

**Group B**

**ECOLOGY AND ENVIRONMENT BIOLOGY**

1. Holocenotic nature of environment, Limiting factors, Ecological amplitude, Triggering factors (Soil, water, atmosphere)
2. Ecological adaptations; Concept, Ecads, Ecotypes and Ecoclines, Adaptation in relation to soil oligotrophy.
3. Population : Concepts, Density and pattern, Population growth, Carrying capacity, Population regulation,  $r$  and  $k$  selection, Population interactions.
4. Community : Community characteristics (analytical and synthetic) and their measurement, Species diversity (alpha, beta and gamma); Ecological niche concept.
5. Ecosystem : Concept, Structure and functions of ecosystem, energy flow and its models, Ecological efficiencies, Cycling of C, N & P, Primary and secondary productivity.
6. Ecological succession : Types and modern concept of mechanism of succession.

7. Plant indicators and their role in environmental monitoring.
8. Phytogeography : General principles, Endemism, Vegetation of India.
9. Natural resources, types and their conservation.
10. Pollution of air, water and soil; Environmental toxicity; Prevention and control of pollution, global warming, Ozone depletion.
11. Environmental Impact Assessment : A brief account.

## BOTANY (HONOURS)

### Paper IV

**Time - 3 hours**

**Full Marks - 75**

Ten questions to be set (Three questions from Group A, B and C). Five questions to be answered at least one question from each group including Question No. 1 which will be objective and compulsory.

#### Group A

**Meristems and Development** : Shoot apical meristem, Root apical meristem, lateral meristem and their functions.

**Secondary body of the Plant** : Vascular cambium; Secondary xylem (basic structure of wood); Secondary Phloem and periderm, Abnormal Secondary growth, *Dracaena*, *Tecoma*, *Nyctanthes*, *Bignonia*.

#### Group B

**Domestication of Plants** : Primary and secondary centers of origin; Plant introductions, A general account and agronomy of *wheat*, *rice*, *maize*, *potato*.

**Legumes** : Chickpea (Bengal gram), Red gram (arhar) & Fodder legumes - a general account.

**Vegetable Oil Sources** : Mustard, Groundnut, Soybean - A brief account

**Plant Fibres** : Cotton, Jute and Coir.

**Timber & Firewood species** : A general account, use and properties of any ten plants of your region.

**Medicinal Plants** : A brief account of ten important plant drugs and their chief constituents used in indigenous and allopathic systems of medicine.

**Natural rubber (*Hevea brasiliensis*), Essential Oils, Insecticides and Dyes** : A concise account.

**Ornamental plant :** Familiarity with seasonals and perennials grown in your locality.

### Group C

#### ANGIOSPERM SYSTEMATICS

**Introduction :- Aims and components of systematics :** Nomenclature, Phylogeny and classification

**Systematics in Practice :** Importance of Herbarium, Specimens and their preparation; Role of herbaria and botanical gardens.

**Taxonomic hierarchy :** Taxonomic category; Taxonomic groups, Concepts of species, Genus and family.

**Botanical Nomenclature :** ICBN, Principles and rules, Ranks and names, Type method, Principle of priority and its limitations, Names of hybrids and cultivars; Concept of biocode.

**Systems of Classifications :** Bentham and Hooker's system, Engler and Prantl's systems and Hutchinson's system.

**Modern Taxonomy :** Taxonomy in relation to Anatomy, Embryology, Cytology and Phytochemistry.

**Diagnostic features, floral range & economic importance of the families :** Ranunculaceae, Caryophyllaceae, Rosaceae, Cucurbitaceae, Apocyanaceae, Labiatae. (Lamiaceae), Orchidaceae and Cyperaceae.

### BOTANY(HONOURS)

#### PRACTICAL

Time - 6 hours	Full Marks - 50
Physiology	- 10
Family Descriptions	- 10
Ecology	- 05
Anatomy	- 05
Economic Botany	- 05
Spotting	- 05
Class records	- 05
Viva voce	- <u>05</u>
Total	50

**ZOOLOGY (HONOURS)****Paper III****Time - 3 hours****Full Marks - 75**

Ten questions are to be set. Question number 1 will be compulsory and objective (numbering fifteen, each of one mark) covering the whole syllabus. Students will be required to answer any five questions in all, including question number one.

**Group A**

1. Origin and general characters of Chordates.
2. Structure, life cycle of *Herdmania*.
  - Retrogressive metamorphosis
3. Salient features and affinities of Cyclostome.
4. **Fishes** -
  - classification upto orders.
  - Scales in fishes.
  - Respiration in fishes - with accessory respiratory organs.
  - Comparison of Cartilaginous & Bony fishes with reference to *Scoliodon* & *Labeo*.
  - General Account of Dipnoi.
5. **Amphibia** -
  - Origin & evolution.
  - Classification upto orders.
  - Neoteny
6. **Reptiles** -
  - Classification upto orders.
  - Biting & Feeding mechanism in snakes.
  - Structure & affinities of *Sphenodon*.
7. **Birds** -
  - Origin of Birds.
  - Concept of Ratitae & Carinatae.
  - Respiration in birds.
  - Flight adaptation in birds
8. **Mammals** -
  - General account of Prototheria and Metatheria.
  - General account of Primates.

**Group B**

Comparative Anatomy of Vertebrates with special reference to :

1. - Integument
2. - Gastro-intestinal tract
3. - Heart
4. - Aortic arches
5. - Brain
6. - Evolution of kidney, Urinogential system
7. - Reproductive organs & gonads

**ZOOLOGY (HONOURS)****Paper IV**

**Time - 3 hours**

**Full Marks - 75**

Ten questions are to be set. Question number 1 will be compulsory and objective (numbering fifteen, each of one mark) covering the whole syllabus. Students will be required to answer any five questions in all, including question number one.

**Group A**

1. Digestion & absorption of dietary components  
Natural aspects, Vitamins related disorders
2. **Respiration -**
  - Mechanism and control of breathing
  - Aerodynamics of lungs
  - Transport of gases
3. **Blood -**
  - Composition and function of blood & lymph
  - Blood groups
  - Mechanism of blood clotting
  - Structure of haemoglobin & types
4. **Heart -**
  - Structural/Functional aspects of human heart
  - Conduction, cardiac cycle, heart rate & cardiac index, ECG & defects
5. **Structural/ Functional aspects of mammalian kidney**
  - Physiology of urine formation in mammal
  - Osmoregulation in fishes and mammals

6. **Glycogenesis****Group B****Vertebrate Endocrinology and Reproductive Physiology**

1. Classification of hormones
2. Mechanism of hormone action
3. Structure and mechanism of action and function of insulin
4. Biosynthesis of hormones of - Thyroid, Adrenal, Ovary & Testis
5. Reproductive cycle in Vertebrates
6. Hormonal regulation of gametogenesis in male and female
7. Endocrine disorders.
8. Changes in maternal physiology during pregnancy

**ZOOLOGY (HONOURS)****Practical****Time - 6 hours****Full Marks -50**

(Expt.- 30, viva-12, NB- 8)

1. **Dissection** 1×10= 10 marks
  - (i) Scoliodon and Bony fish - Afferent and Efferent blood vessel cranial nerves, Internal ear, Accessory respiratory organ of *Heteropneustis fossilis*.
2. **Mounting** :- Ampulla of Lorenzini, Scales of fishes, vaginal smear of rat to study estrous cycle. 1×5 = 5 marks
3. **Physiology** - 1×5 = 5 marks
  - i. Haemoglobin
  - ii. Blood cells count
  - iii. Determination of Bleeding and clotting time
  - iv. Recording of heart beat
4. **Spotting** 10×2= 20 marks
  - i. Museum specimens 2
  - ii. Slides - Histology & Embryology 4
  - iii. Bones - Limbs of frog 1
  - Girdles of Varanus 1
  - Skull of Fowl 1
  - Vertebrae of Rabbit 1
5. **Records and field collection** 5 marks
6. **Viva-voce** 5 marks



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COURSES OF STUDY  
for  
B.Sc. (Subsidiary) Part II Examination

**PHYSICS (SUBSIDIARY)**  
Paper II

Time - 3 hours

Full Marks - 75

Twelve questions to be set. Six to be answered (taking at least one from group B and two from group A & C each)

**Group A**

**Optics (Four questions to be set)**

General theory of image formation : Cardinal points of an optical system, general relationship, thick lens and lens combinations.

interference of light : Division of wavefront and division of amplitude, Michelson Interferometer.

Fresnel diffraction : Half-period zones, straight edge, explanation of rectilinear propagation of light

Fraunhofer diffraction : Diffraction at a slit

Diffraction at N Parallel slits; plane diffraction grating

Rayleigh criterion, resolving power of telescope.

Dispersion and Scattering : Theory of dispersion of light, absorption bands and anomalous dispersion, Theory of Rayleigh Scattering.

Purity of a spectral line, coherence length and coherence time, Einstein's A and B coefficients, coherence of induced emissions, Conditions for laser action, population inversion, Ruby Laser, He-Ne Laser.

**Group B**

**Electricity and Magnetism (Two questions to be set)**

Electric Field : Field due to quadrupole. Torque on a dipole in non-uniform fields

Potential energy of a system of charges.

Diamagnetism, Paramagnetism due to free ions and conduction electrons, concept of domains and Ferromagnetism, Langevin's and Weiss theories, Curie's law.

**Current Electricity & Modern Physics (Four questions to be set)**

Alternating Currents : Skin effect for resistance at high frequencies; Complex impedance, reactance, impedances of LCR series and parallel circuits, resonance, Q factor, Power dissipation and Power factor, A.C. Bridges : Anderson's and DeSauty bridges.

Nuclear Models : Liquid drop model and mass formula, The shell model.

Radioactivity : Decay constant and half-life, Beta-decay, Fermi's theory, neutrino and anti-neutrino

Accelerators : Need for accelerators; cyclic accelerators, cyclotron, synchrocyclotron, quark hypothesis.

**PHYSICS (SUBSIDIARY)****Practical**

Time - 3 hours

Full Marks - 25

(One experiment to be performed in examination)

(Expt. - 15, viva-6, NB- 4)

The course shall include the following experiments

1. Study of characteristics of a Ballistic galvanometer
2. Study of magnetic field using a vibration magnetometer.
3. Obtaining the B-H curve of a ferromagnetic material (any method)
4. Low resistance measurement, C.F. Bridge or any other method.
5. Study of NAND and NOR circuits (discrete and integrated circuits)
6. Using an AC bridge to measure L or C.
7. Use of Newton's ring to determine the radii of curvature of surfaces

**CHEMISTRY (Subsidiary)****Paper II**

Time - 3 hours

Full Marks - 75

Twelve questions to be set. Six to be answered (at least Two from Group A, One from Group B and Two from Group C)

**Group A****Physical Chemistry**

1. **Chemical Kinetics** - Rate of reaction, order and molecularity of reaction, first and second order, derivation of rate constant, methods of determining order reaction, half life and its unit.
2. **Cell** : Reversible electrodes and cells, electrode potential oxidation-reduction potential, criteria of chemical reaction with reference to electrode potential and e.m.f simple idea about concentration cell (without transference) and their e.m.f.
3. **Phase Equilibria** - Phase, component and degree of freedom, one component system, water and sulphur system, Triple point, heating and cooling curves.
4. **ElectroChemistry** - Conductivity and its measurements specific conductance, Equivalent conductance and molar conductance, Kohlrausch's law, Variation of conductivity with dilution, ionic conductance transport number and its measurements, application of conductance measurements.
5. **Ionic equilibria** : Ostwald's dilution law, ionic product of water, Modern concepts of acids and base, Solubility products, applications of solubility products principles, hydrolysis constants, pH, buffer solutions, acid-base indicators.

**Group B****Organic Chemistry**

1. A brief idea of substitution, addition and elimination reaction including mechanism of nitration, sulphonation and halogenation.
2. **Stereo isomerism** : Optical activity, optical isomerism of lactic and tartaric and racemic and meso form, resolution, Geometrical isomerism of maleic acid and fumaric acid.

3. **Hydroxy acid** : Preparation and properties of lactic, tartaric and citric acid.
4. **Carbohydrate**: Definition and classification, Conversion of glucose into fructose and reverse. Ascending and descending series of monosaccharide, Open chain structure of glucose and fructose, Mutarotation.
5. **Benzene** : Aromaticity, Orientation, Idea of ortho and para orienting groups

#### Preparation and properties of

(a) Nitrobenzene (b) Aniline (c) Benzene diazonium chloride, phenol, Benzaldehyde and benzoic acid

#### A brief idea of

- i. Friedel Craft's reaction
- ii. Sand mayer's reaction
- iii. Cannizzaro's reaction
- iv. Perkin's reaction
- v. Kolbe's reaction
6. Active methyle compounds

Active methyle groups, keto enol tautomerism, preparation and properties of ethylaceto acetate and malonic ester.

### Group C

#### Inorganic Chemistry

1. **Chemical bonding** : Directional character of covalent bond, resonance, hybridisation and bonds structure and shape of molecules of the type  $AB_2$ ,  $AB_3$ ,  $AB_4$ ,  $AB_5$ ,  $AB_6$ , and  $AB_7$ , M.O. diagram for diatomic systems, bond order, bond length and bond energy, dipole moment and percentage ionic character, hydrogen bond.
2. **Radioactivity** :  $\alpha$ ,  $\beta$  and  $\gamma$  rays, group displacement law, isotope, isobars and isotones, induced radioactivity, balancing of nuclear equation, natural radiocative series.
3. **Group studies** : Boron: Boronhalides, Boronhydrides, Boric acid and Borates, Borazole, chemistry of Borax bead test.  
**Nitrogen family** : Hydrazine, Hydrazoic acid, Oxides and Oxyacids of phosphorus, analytical tests for nitrate and phos-

phate, nitrogenous and phosphatic fertilizers.

**Sulphur family** : Halides and Oxyacids of sulphur, selenium and tellurium, Peracids of Sulphur, Sodium thiosulphate.

4. General characteristics of transition and nontransition elements : Stability of different oxidation states, variation of atomic and ionic radii, acid, base behaviour of oxides, hydrolysis and amphotericism of compound, magnetic properties and complex formation.
5. **Co-ordination compounds** : Double salts and complex compounds, Werner's theory, co-ordination number, ligands and their classification, isomerism in complexes, Sidgwick EAN rule, valence bond model and inner and outer orbital complexes, inner complexes, application of complex compounds in qualitative analysis.

#### Books Recommended

1. Physical Chemistry by P. C. Rakshit
2. Advance Physical Chemistry by Bahl and Bahl
3. Physical Chemistry through Problems by S. K. Dogra & S. Dogra
4. Inorganic Chemistry by Puri, Sharma and Jauhar
5. Inorganic Chemistry by T. Sharma
6. Inorganic Chemistry by Huhee
7. Organic Chemistry by M. K. Jain
8. Modern Organic Chemistry by I. L. Finar
9. Advance Organic Chemistry by B. S. Bahl & Arun Bahl

### CHEMISTRY (SUBSIDIARY)

#### Practical

Time - 3 hours

Full Marks - 25

- |  |          |
|--|----------|
| 1. Volumetric analysis<br>Use of $\text{KMnO}_4$ , $\text{K}_2\text{Cr}_2\text{O}_7$ , Oxalic and Sodiumthiosulphate | 10 marks |
| 2. Organic group detection   | 10 marks |
| 3. Viva -voce and Note-Book  | 5 marks  |

**MATHEMATICS (Subsidiary)****Paper II****(Calculus and Analytical Geometry)**

Time - 3 hours

Full Marks - 100

Twelve questions to be set. Six to be answered selecting at least one from each group.

**Group A****Differential Calculus (Three questions)**

Leibnitz theorem, Taylor's series and Maclaurin's series, Partial derivatives, Euler's theorem, Equation of Tangents and Normals, Asymptotes, Formulae of radius of curvature in different co-ordinate system, Maxima and minima of functions of single variable

**Group B****Integral Calculus (Three questions)**

Integration of summation method, Reduction formula, Rectification and quadrature with simple examples, Surface and volume of solids of revolution, Moment of inertia, Simple use of double and triple integration and Gamma and Beta functions

**Group C****Differential Equations (Three questions)**

Degree and order of differential equations, Equations of first order and first degree, Separation of variables, Homogeneous equations, Linear equations and reducible to linear form, Exact differential equations, First order higher degree differential equations, Solvable for  $x$ ,  $y$ ,  $p$ , Clairaut's form, Linear differential equations of second order with constant co-efficients, Orthogonal trajectories

**Group D****Vector Analysis and Mechanics (Three questions)**

Classification of Vectors, Triple products, Differentiation of vector functions, Differentiation of a product of two vectors, Gradient of a scalar, Divergence and curl of a vector in Cartesian co-ordinate

**Books Recommended**

1. Differential Calculus by Das Gupta
2. Differential Calculus by Shanti Narayan
3. Differential Calculus by Laljee Prasad
4. Integral Calculus by Shanti Narayan
5. Integral Calculus by A. Das Gupta
6. Integral Calculus by Laljee Prasad
7. Vector Analysis by Laljee Prasad
8. Vector Analysis by Das Gupta

**BOTANY (Subsidiary)****Paper II****Time - 3 hours****Full Marks - 75**

Ten questions to be set, six from Group A and four from Group B.  
Five to be answered, selecting three from group A and two from group B.

**Group A****1. Taxonomy**

- i. Classification of angiosperm with reference to Linnaeus, Bentham and Hooker, Engler and Prantl and Hutchinson.
- ii. Diagnostic feature and economic importance of the following families -

*Ranunculaceae,**Cucurbitaceae,**Acanthaceae,**Convolvulaceae,**Scrophulariaceae,**Euphorbiaceae,**Musaceae and**Cyperaceae***2. Anatomy**

- i. Meristem
- ii. Root stem transitions
- iii. Anomalous Secondary growth with reference to the stem of *Boerhaavia*, *Nyctanthes*, *Tinospora*, and *Dracaena*
- iv. Periderm - Structure, origin, duration and function.

**Group B****3. Physiology**

- i. Water relation - Interrelationship among O.P., T.P. and D.P.D
- ii. Stomatal regulation
- iii. Translocation of organic solutes
- iv. Photosynthesis - Electron - transfer, Photophosphorylation, Photolysis of water,  $C_3$  and  $C_4$  cycle.
- v. Respiration - Glycolysis, Krebs' cycle
- vi. Elementary idea of Phytohormones, Gibberellins & Cytokinins

**4. Ecology**

- i. Elementary idea of ecosystem and its components
- ii. Plant Succession - Hydrosere, Xerosere.
- iii. Brief idea of water and air pollution, its causes and control.

**5. Cytogenetics**

- i. Mitosis and Meiosis

- ii. Mendelism
- iii. Chromosome
- iv. DNA and RNA
- v. Elementary idea of Linkage, Crossing over, Polyploidy, Mutation.

### Books Recommended

1. Plant Taxonomy by Laurance
2. Taxonomy by V. P. Naik
3. Anatomy by Eames and Mc Daniel
4. Plant Antomy by P. K. Daradhiyar
5. Plant Physiology by Bidwell
6. An Introduction to Ecology by R. S. Ambastha
7. Ecology by Odum
8. Genetics and Plant Breeding by U. Sinha and S. Sinha
9. पादप शरीर क्रिया विज्ञान की पाठ्य पुरतक - वी० वर्मा
10. पादप परिस्थिति एवं पादप भूगोल के मूल तत्व - बृज गोपाल
11. पादप परिस्थितकी - एन० के० प्रसाद
12. कृषिक विज्ञान, अनुवांशिकी एवं विकास - पी० के० गुप्ता

### BOTANY(SUBSIDIARY)

#### Practical

Time - 3 hours

Full Marks - 25

1. Temporary slide preparation, sketches and characteristic feature of given anatomical material. 5 marks
2. Description of the given angiospermic plant in semitechnical terms and identification upto the family level 5 marks
3. Identification and comment upon the given spots 4 marks
  - a. Anatomy 1 mark
  - b. Ecology 1 mark
  - c. Cytology 1 mark
  - d. Morphology 1 mark
4. Comment upon Phsyiology Experiment 4 marks
5. Practical Record 5 marks
6. Viva-voce 4 marks



**ZOOLOGY(SUBSIDIARY)****Paper II**

Time - 3 hours

Full Marks - 75

Five questions are to be set from each group. Students shall answer five questions in all, attempting not more than **three** from each group.

**Group A****Chordata**

1. **Bionomics : General characters and classification (upto orders only) of living Chordates of the following groups :-**  
Protochordata, Cyclostomata, Pisces, Amphibia, Reptilia, Aves and Mammalia.
2. **Study of the following :-**
  - i. Urochordata-*Herdmania* (including Retrogressive metamorphosis)
  - ii. Cephalochordata - *Amphioxus*
  - iii. Pisces - *Scolodon* - Type study : differences with that of a Bony fish.
  - iv. Reptilia - Biting and feeding mechanism of snakes.
  - v. Aves - *Columba* :  
Flight adaptations, Elementary idea of bird migration and Bird Sanctuaries in India.
  - vi. Mammalia - Characters, distribution and affinity of Prototheria and Metatheria.
3. **Comparative study of the following in Vertebrates :**  
Integument, Heart, Aortic arches and Brain.

**Group B**

1. **Embryology :**
  - i. Types of vertebrate eggs and their early cleavage.
  - ii. Development of *Amphioxus* (upto the formation of coelom) and Chick (upto 3 germinal layers)
  - iii. Placenta in Mammals - Its development, types and functions.
2. **Biochemistry, Physiology and Endocrinology :**
  - i. Structure and classification of Proteins, Carbohydrates & Fats
  - ii. Physiology of Digestion, Excretion & Respiration in Mammals.

**Books Recommended**

1. Modern Text Book of Vertebrates By **R. L. Kotpal**
2. Chordate Zoology and Animal Physiology by **E. L. Jordan** and **P. S. Verma**
3. Chordate Embryology by **Verma, Agarwal** and **Tyagi**
4. A Text Book of Animal Physiology by **Goel** and **Shastri**
5. A Text Book of Animal Physiology by **A. K. Berry**
6. Human Physiology Vol. II by **Chatterjee**

**ZOOLOGY (SUBSIDIARY)****Practical****Time - 3 hours****Full Marks - 25**

1. **Dissection** 1×7=7 marks  
*Scoliodon* - Afferent and efferent branchial arteries, Cranial nerves (V and VII) and (IX and X), Internal ear, Eye muscles and their nerves supply, Urinogenital system.  
*Columba* - Flight muscles, Arterial and Venous systems.
2. **Mounting (Permanent stained preparation)** 1×4=4 marks  
 Scales of fishes, Pecten and Filoplume feather of birds, Ampulla of Lorenziini.
3. **Spotting** 1×6=6 marks  
 Museum Specimen 1 mark  
 Bones 3 marks  
 (Limb, Girdle, Skull, Vertebrae of Varanus and Fowl)  
 Slides 2 marks
4. **Endocrinology and Embryology** 2×2=4 marks
  - i. Identification of permanent slides of the various developmental stages of Frog and Chick.
  - ii. Identification and comment upon the histological structure of various Endocrine glands.
5. **Practical Records** 4 marks

**COURSES OF STUDY**

for

**Commerce subjects/group of subjects  
for B.Com (General) Part II Examination**

Time - 3 hours

Full Marks - 100

**Paper IV****BUSINESS REGULATORY FRAMEWORK**

- i. Laws of Contract - Nature of contract, offer and acceptance, Capacity of parties to contract, Free consent, consideration, Performance of contract, Discharge of contract, Indemnity and guarantee Bailment, Pledge, Agency.
- ii. Sale of Goods Act - Formation of Contract of sale, Conditions and warranty, Transfer of property in goods, unpaid seller and his rights.
- iii. Negotiable instrument Act - Definition of Negotiable instruments, Features, Bill of Exchange and cheque, Holder and Holder in due course, Dishonour and Discharge of Negotiable instruments.
- iv. Arbitration Act - Definition and Main provisions, arbitrators.
- v. Consumer Protection Act - Salient features, Definition of consumer, Grievance Redressal Machinery.

**Suggested Readings :**

1. Kauchal M. C. - Business Law, Vikas Publishing House, N. Delhi
2. Kapoor N. D. - Business Law, Sultan Chand & Sons, New Delhi
3. Singh Atar - The Principles of Mercantile Law, Eastern Book Company, Lucknow
4. Prasad Manmohan -Vyaparik Sanniyam, Motilal Banarsi Das, Patna
5. Nolakha, Tiwari & Kithari - Vyavsayik Niyaman Vyavastha, Ramesh Book Depot
6. Sen A.K. & Mitra J.K. - Commercila Law - The World Press Pvt. Ltd., Kolkata

**INDIAN ECONOMY**

- i. Economic Development - Concept of Economic Development and Growth, Meaning and Indicators of Under Development, Common Characteristics of Developing Nations, Features of Indian economy
- ii. Economic Planning - Meaning and rationale of economic planning, Planning process, Strategy of India's Development Plan, Assessment of Indian Plans.
- iii. Issues in Agricultural - Role of Agriculture in Indian Economy, Causes of Low Productivity, Measures of Increasing Productivity Green Revolution and its Impact, Agricultural Finance and Marketing, Development Plans and Agriculture.
- iv. Industrial Development - Programmes of Industrial Development under Plans, Problems of Industrial Development in India, Major Industries of India like Iron & Steel, Jute, Sugar, Engineering and IT Industries, Role and Importance of Small and Cottage Industry in Indian Economy.
- v. Economic Policy - Globalisation and Indian Economy, New Economic and Industrial Policy 1991, MNCs in Indian Economy.

**Suggested Readings :**

1. Mishra & Puri - Indian Economy, HPH, Bombay
2. Rundra Dutta & KPM Sundram - Bhartiya Arthvyavstha, S. Chand & co.n New Delhi.
3. Pnady Sridhar - Bharat ka Arthik Vikas, Motilal Banarsi Das, Patna
4. Mamoriya C. B. - Bhartiya Arthvyavstha
5. Annual Report on Agriculture & Industry, The Hindu, Chennai.

## Paper VI

**MONETARY AND FINANCIAL SYSTEM**

- i. Money - Definition, Functions and Importance of Money, Paper Currency, Value of Money, Quantity Theory of Money, Inflation, Index Numbers.
- ii. Financial System - Role of Finance in an Economy, Kinds of Finance, Components of Financial System, Financial Institutions, Financial Market and Financial Instruments, Financial market and Financial Instruments.
- iii. Indian Banking System - Concept and importance of Bank in Indian Financial System, Functions of Commercial Banks, Process of Credit Creation by Banks, Investment Policy of Commercial Banks, Central Bank.
- iv. Central Banking - Functions of Central Bank, Credit control by Central Bank, Reserve Bank of India.
- v. International Organization - Objectives, Achievements and Criticisms of IMF and IBRD, India and World Bank.

**Suggested Readings :**

1. Chandler L. V. & Golfeld S.M. - The Economics of Money and Banking, Harper and Row, New York.
2. Khan M. Y, - Indian Financial System Theory and Practice, Tata McGraw Hill
3. Trivedi Dasora & Nagon - Mudra avam Vittyta Pranali , Ramesh Book Depot.
4. Multan D,M, - Money and Financial System, HPH, Bombay
5. Ghosh & Ghosh - Fundamental of Monetary Economics, HPH, Bombay
6. Sethi T.T. - Money, Banking and International Trade, S. Chand & Co. Ltd., New Delhi

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COURSES OF STUDY  
for  
**for B.Com (Honours) Part II Examination**

**(A) ACCOUNTING & FINANCE GROUP**

Time - 3 hours

Full Marks - 100

**Paper III**

**BUSINESS REGULATORY FRAMEWORK**

- i. Laws of Contract - Nature of contract, offer and acceptance, Capacity of parties to contract, Free consent, consideration, Performance of contract, Discharge of contract, Indemnity and guarantee Bailment, Pledge, Agency.
- ii. Sale of Goods Act - Formation of contract of sale conditions and warranty, Transfer of property in goods, Unpaid seller and his rights.
- iii. Negotiable Instrument Act - Definition of Negotiable Instruments, Features, Bill of Exchange and cheque, Holder and Holder in due-course, Dishonour and Discharge of Negotiable Instruments.
- iv. Arbitration Act - Definition and Main provisions, Arbitrators.
- v. Consumer Protection Act - Salient Features, Definition of Consumer, Grievance Redressal Machinery.

**Suggested Readings :**

1. Kauchal M. C. - Business Law, Vikas Publishing House, N. Delhi
2. Kapoor N. D. - Business Law, Sultan Chand & Sons, New Delhi
3. Singh Atar - The Principles of Mercantile Law, Eastern Book Company, Lucknow
4. Prasad Manmohan -Vyaparik Sanniyam, Motilal Banarsidas, Patna
5. Nolakha, Tiwari & Kishari - Vyavsayik Niyaman Vyavastha, Ramesh Book Depot
6. Sen A.K. and Mitra J.K. - Commercial Law - The World Press Pvt. Ltd., Kolkata

## Paper IV

**SECURITY ANALYSIS & PORTFOLIO MANAGEMENT**

- i. Introduction - Concept of Investment and Portfolio, Portfolio Management, Coverage of Portfolio Management, Investment Environment and Organization, Portfolio Manager.
- ii. Investment Process - Investors, Investment outlets, Risk and Return. Significance of Beta, Making of Portfolio.
- iii. Portfolio Analysis - Traditional Portfolio Analysis, Markowitz Model, Fundamental Analysis.
- iv. Indian Stock Market - Networking and Activities of stock exchange, Recent Development, OTCEI, SEBI and its provisions.
- v. Financial Institutions - Role and Importance of Financial Institutions in Indian Financial system, Working and organization of IDBI and ICICI.

**Suggested Readings :**

1. Shape, Alexander and Baily - Investment, Prentice Hall, N. Delhi
2. Fischer and Jordan - Security Analysis and Portfolio Mgt, Prentice Hall, New Delhi.
3. Russel land James - Modern Investment and Security Analysis, McGraw Hill, New York.
4. Singh Preek - Investment management, HPH, Bombay
5. Jha, G. K. & Jha, D. - ABC of Portfolio Management (in Press).
6. Bhalla V.K. - Investment Management( Security Analysis & Portfolio Management), S. Chand & Co. Ltd., New Delhi.

**(B) MARKETING GROUP**

Time - 3 hours

Full Marks - 100

## Paper III

**BUSINESS REGULATORY FRAMEWORK**

- i. Laws of Contract - Nature of contract, offer and acceptance, Capacity of parties to contract, Free consent, consideration, Perfo-

- formance of contract, Discharge of contract, Indemnity and guarantee  
Bailment, Pledge, Agency.
- ii. Sale of Goods Act - Formation of contract of sale conditions and warranty, Transfer of property in goods, Unpaid seller and his rights.
  - iii. Negotiable Instrument Act - Definition of Negotiable Instruments, Features, Bill of Exchange and cheque, Holder and Holder in due-course, Dishonour and Discharge of Negotiable Instruments.
  - iv. Arbitration Act - Definition and Main provisions, Arbitrators.
  - v. Consumer Protection Act - Salient Features, Definition of Consumer, Grievance Redressal Machinery.

### **Suggested Readings :**

1. Kauchal M. C. - Business Law, Vikas Publishing House, N. Delhi
2. Kapoor N. D. - Business Law, Sultan Chand & Sons, New Delhi
3. Singh Atar - The Principles of Mercantile Law, Eastern Book Company, Lucknow
4. Prasad Manmohan -Vyaparik Sanniyam, Motilal Banarsidas, Patna
5. Nolakha, Tiwari & Kithari - Vyavsayik Niyaman Vyavastha, Ramesh Book Depot
6. Sen A.K. and Mitra J.K. - Commercial Law - The World Press Pvt. Ltd., Kolkata

## **Paper IV**

### **INTERNATIONAL MARKETING**

- i. Introduction - Nature, Definition and scope of Internations Marketing, Domestic vs International marketing, Marketing strategy of MNC's.
- ii. Product Planning for International Market - Product Mix, Branding, Packaging, Quality issues, After Sales Service.
- iii. International Pricing - Factors influencing International Price, Pricing process and Methods.
- iv. Promotion and Distribution - Methods of International Promotion, Advertising, International distribution Channels.



- v Export Policy and Practices in India - Exim policy, Trends in Indian Foreign Trade, Export pricing, Export Finance.

### Suggested Readings :

1. Bhattacharya and Varchney - International Marketing Management, Sultan Chand, New Delhi.
2. Kriplani V. - International Marketing, Prentice Hall, New Delhi
3. Iceegan W.J. - Multinational MKGTg Mgt, Prentice Hall, N. Delhi
4. Kothari Jain - Antarrashtriya Vipnan, Ramesh Book Depot.
5. Rathor, Rathor & Jain - International Marketing - HPH Bombay.

## (C) INTERNATIONAL BUSINESS GROUP

Time - 3 hours

Full Marks - 100

### Paper III

#### BUSINESS REGULATORY FRAMEWORK

- i. Laws of Contract - Nature of contract, offer and acceptance, Capacity of parties to contract, Free consent, consideration, Performance of contract, Discharge of contract, Indemnity and guarantee Bailment, Pledge, Agency.
- ii. Sale of Goods Act - Formation of contract of sale conditions and warranty, Transfer of property in goods, Unpaid seller and his rights.
- iii. Negotiable Instrument Act - Definition of Negotiable Instruments, Features, Bill of Exchange and cheque, Holder and Holder in due-course, Dishonour and Discharge of Negotiable Instruments.
- iv. Arbitration Act - Definition and Main provisions, Arbitrators.
- v Consumer Protection Act - Salient Features, Definition of Consumer, Grievance Redressal Machinery.

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1. Kauchal M. C. - Business Law, Vikas Publishing House, N. Delhi
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4. Prasad Manmohan -Vyaparik Sanniyam, Motilal Banarsidas, Patna
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6. Sen A.K. and Mitra J.K. - Commercial Law - The World Press Pvt. Ltd., Kolkata

### Paper IV

### INTERNATIONAL MARKETING

- i. Introduction - Nature, Definition and scope of Internations Marke-ting, Domestic vs International marketing, Marketing strategy of MNC's.
- ii. Product Planning for International Market - Product Mix, Brand- ing, Packaging, Quality issues, After Sales Service.
- iii. International Pricing - Factors influencing International Price, Pricing process and Methods.
- iv. Promotion and Distribution - Methods of International Promotion, Advertising, International distribution Channels.
- v. Export Policy and Practices in India - Exim policy, Trends in Indian Foriegn Trade, Expert pricing, Export Finance.

#### Suggested Readings :

1. Bhattacharya and Varchney - International Marketing Managem-ent, Sultan Chan, New Delhi.
2. Kriplani V. - International Marketing, Prentice Hall, New Delhi
3. Iceegan W.J. - Multinational MKGTg Mgt, Prentice Hall, N. Delhi
4. Kothari Jain - Antarrashtriya Vipnan, Ramesh Book Depot.
5. Rathor, Rathor & Jain - International Marketing - HPH Bombay.

55  
**COURSES OF STUDY**  
for  
**B.Com Subsidiary subjects**  
**Part II Examination**

Subsidiary Papers for All Three Groups of Honours

Subjects will be same

Time - 3 hours

Full Marks - 100

**Paper III**  
**INDIAN ECONOMY**

- i. Economic Development - Concept of Economic Development and Growth, Meaning and Indicators of Under Development, Common Characteristics of Developing Nations, Features of Indian economy
- ii. Economic Planning - Meaning and rationale of economic planning, planning process, Strategy of India's Development Plan, Assessment of Indian Plans.
- iii. Issues in Agricultural - Role of Agriculture in Indian Economy, Causes of Low Productivity, Measures of Increasing Productivity Green Revolution and its Impact, Agricultural Finance and Marketing, Development Plans and Agriculture.
- iv. Industrial Development - Programmes of Industrial Development under Plans, Problems of Industrial Development in India, Major Industries of India like Iron & Steel, Jute, Sugar, Engineering and IT Industries, Role and Importance of Small and Cottage Industry in Indian Economy.
- v. Economic Policy - Globalisation and Indian economy, New Economic and Industrial Policy 1991, MNCs in Indian Economy.

**Suggested Readings :**

1. Mishra & Puri - Indian Economy, HPH, Bombay
2. Rundra Dutta & KPM Sundram - Bhartiya Arthvyabstha, S. Chand & co.n New Delhi.
3. Pnady Sridhar - Bharat ka Arthik Vikas, Motilal Banarse Das, Patna
4. Mamoriya C. B. - Bhartiya Arthvyabstha

5. Annual Report on Agriculture & Industry, The Hindu, Chennai.

### Paper IV

## MONETARY AND FINANCIAL SYSTEM

- i. Money - Definition, Functions and Importance of Money, Paper Currency, Value of Money, Quantity Theory of Money, Inflation, Index Numbers.
- ii. Financial System - Role of Finance in an Economy, Kinds of Finance, Components of Financial System, Financial Institutions, Financial Market and Financial Instruments, Financial Market and Financial Instruments.
- iii. Indian Banking System - Concept and importance of Bank in Indian Financial System, Functions of Commercial Banks, Process of Credit Creation by Banks, Investment Policy of Commercial Banks, Central Bank.
- iv. Central Banking - Functions of Central Bank, Credit control by Central Bank, Reserve Bank of India.
- v. International Organization - Objectives, Achievements and Criticisms of IMF and IBRD, India and World Bank.

### Suggested Readings :

1. Chandler L. V. & Golfeld S.M. - The Economics of Money and Banking, Harper and Row, New York.
2. Khan M. Y, - Indian Financial System Theory and Practice, Tata McGraw Hill
3. Trivedi Dasora & Nagon - Mudra avam Vittyā Pranālī , Ramesh Book Depot.
4. Multan D,M, - Money and Financial System, HPH, Bombay
5. Ghosh & Ghosh - Fundamental of Monetary Economics, HPH, Bombay.
6. Sethi T.T. - Money, Banking and International Trade, S. Chand & Co. Ltd., New Delhi

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