

B.Sc.-III (Chemistry) Syllabus
2019-20, 2020-21 & 2021-22

SEMESTER V

| Paper | Title | Max. Marks | Minimum Pass Marks |
|--------------|-----------------------|-------------------|---------------------------|
| I | INORGANIC CHEMISTRY | 35 | 12 |
| II | ORGANIC CHEMISTRY | 35 | 12 |
| III | PHYSICAL CHEMISTRY | 35 | 12 |
| I | PRACTICAL CHEMISTRY-I | 45 | 16 |

SEMESTER VI

| Paper | Title | Max. Marks | Minimum Pass Marks |
|--------------|------------------------|-------------------|---------------------------|
| I | INORGANIC CHEMISTRY | 35 | 12 |
| II | ORGANIC CHEMISTRY | 35 | 12 |
| III | PHYSICAL CHEMISTRY | 35 | 12 |
| II | PRACTICAL CHEMISTRY-II | 45 | 16 |

CHEMISTRY
SEM-V

PAPER I : INORGANIC CHEMISTRY

Max. Marks: 35

Semester Paper=26

Internal Assessment=9

Pass Marks: 35%

Time: 3 hrs

30 Hrs (2 Hrs/Week)

3 Periods/Week

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

SECTION-A

I. Metal-ligand Bonding in Transition Metal Complexes.

10 Hrs.

Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting

the crystal-field parameters.

II. Thermodynamic and Kinetic Aspects of Metal Complexes 5 hrs.

A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

SECTION -B

III. Magnetic Properties of Transition Metal Complexes 7 Hrs.

Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula, L-S coupling, Correlation of μ_s and μ_{eff} values, orbital contribution to magnetic moment, application of magnetic moment data for 3d-metal complexes.

IV. Electronic Spectra of Transition Metal Complexes. 8 Hrs.

Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series. Orgel-energy level diagram for d^1 and d^9 states, discussion of electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ complex.

**CHEMISTRY
SEM-V**

PAPER I: ORGANIC CHEMISTRY

Max. Marks: 35

Semester Paper=26

Internal Assessment=9

Pass Marks: 35%

Time: 3 hrs

30 Hrs (2 Hrs/Week)

3 Periods/Week

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

SECTION-A

I. Spectroscopy 8 hrs.

Nuclear magnetic resonance (NMR) spectroscopy.

Proton magnetic resonance (^1H NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling

constants, areas of signals interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2 tribromoethane, ethyl acetate, toluene and acetophenone.

II. Electromagnetic spectrum: Absorption Spectra **7hrs.**

Ultraviolet (UV) absorption spectroscopy-absorption laws (Beer-Lambert's law, Molar absorptivity, presentation and analysis of UV Spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones.

SECTION - B

III Infrared (IR) **5 hrs.**

Infrared (IR) absorption spectroscopy-molecular vibrations, Hooke's law, Selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorption of various functional groups and Interpretation of IR spectra of simple organic compounds.

Problems pertaining to the structure elucidation of simple organic compounds using UV, IR, and PMR spectroscopic techniques.

IV. Organometallic Compounds **5 hrs.**

Organomagnesium Compounds The Grignard reagents formation, structure and chemical reactions.

Organozinc compounds: formation and chemical reactions.

Organolithium compounds: formation and chemical reactions.

V. Organosulphur Compounds **5 hrs.**

Nomenclature, structural features, methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, and sulphonamides.

CHEMISTRY SEM-V

PAPER III: PHYSICAL CHEMISTRY

Max. Marks: 35

Semester Paper=26

Internal Assessment=9

Pass Marks: 35%

Time: 3 hrs

30 Hrs (2 Hrs/Week)

3 Periods/Week

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

SECTION-A

I. Elementary Quantum Mechanics

15 Hrs.

Black-body radiations, Planck's radiation law, photoelectric effect, heat capacity of solids.

Sinusoidal wave equation Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.

Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

SECTION-B

II. Spectroscopy

15 hrs.

Introduction:

Electromagnetic radiation, regions of spectrum, basic features of different spectrometers, statement of Born-Oppenheimer approximation, degrees of freedom.

Rotational Spectrum:

Diatomic molecules. Energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, determination of bond length, qualitative description of non-rigid rotor, isotope effect.

Vibrational Spectrum:

Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.

B.Sc. III, Semester V PRACTICALS

Max. Marks : 45
6 Periods/Week

Time: 4 Hrs.

INSTRUCTIONS FOR EXAMINERS AND CANDIDATES

Candidate are required to prepare inorganic complex and synthesise organic compound. The candidate will perform experiments. Distribution of marks will be as under:

1. Viva-Voce = 10
 2. Note Books = 5
 3. Inorganic Complex = 15 (5 for initial write up)
 4. Organic Synthesis = 15 (5 for initial write up)
- Total 45

Synthesis and Analysis

- (a) Preparation of sodium trioxalatoferate(III), $\text{Na}_3 [\text{Fe}(\text{C}_2\text{O}_4)_3]$ and determination of its composition by permagnometry.
- (b) Preparation of Ni-DMG complex, $[\text{Ni}(\text{DMG})_2]^{2+}$
- (c) Preparation of copper tetra-ammine complex. $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$.
- (d) Preparation of cis-and trans-bis(oxalato)diaquachromate(III) ion.

Synthesis or Organic Compounds

- (a) Iodoform from ethanol and acetone
- (b) Aromatic electrophilic substitution of benzene
 1. p-nitroacetanilide
 2. 2,4,6-tribromophenol
Diazotization/Coupling
 3. Preparation of methyl orange and methyl red
 4. Preparation of benzoic acid from toluene
 5. Reduction
Preparation of m-nitroaniline from m-dinitrobenzene

CHEMISTRY SEM-VI

PAPER I: INORGANIC CHEMISTRY

Max. Marks: 35

Semester Paper=26

Internal Assessment-9

Pass Marks: 35%

Time: 3 hrs

30 Hrs (2 Hrs/Week)

3 Periods/Week

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

SECTION-A

I. Hard and Soft acids and Bases (HSAB)

5 Hrs.

Classification of acids and bases as a hard and soft, Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and

softness, electronegativity and hardness and softness.

II. Bioinorganic Chemistry

10 Hrs.

Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca^{+2} , Nitrogen fixation.

SECTION-B

III. Silicones and Phosphazenes

5 Hrs.

Silicones and Phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

IV. Organometallic Chemistry

10 Hrs.

Definition, Nomenclature and classification of organometallic compounds. Preparation, properties, bonding and applications of alkyls of Li, Al, Hg, Sn and Ti, a brief account of metal-ethylene complexes and homogeneous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

CHEMISTRY

SEM-VI

PAPER II: ORGANIC CHEMISTRY

Max. Marks: 35

Semester Paper=26

Internal Assessment-9

Pass Marks: 35%

Time: 3 hrs

30 Hrs (2 Hrs/Week)

3 Periods/Week

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

SECTION-A

I. Heterocyclic Compounds

7 hrs.

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with

particular emphasis on mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reaction in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.

Introduction to condensed five and six membered heterocycles. Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fischer indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

II. Synthesis of Polymers

3 hrs.

Ziegler-Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.

III. Organic Synthesis Via Enolates

Acidity of α -hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation and acylation of enamines.

SECTION - B

IV. Carbohydrates

7 hrs.

Classification and nomenclature, Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses.

Configuration of monosaccharides. Erythro and threodiastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers, and esters. Determination of ring size of monosaccharides. Cyclic structure of D (+)-glucose. Mechanism of mutarotation.

Structures of ribose and deoxyribose.

An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharide starch and cellulose without involving structure determination.

V. Amino Acids, Peptides, Proteins and Nucleic Acids

8 hrs.

Classification, structure and stereochemistry of amino acids. Acid base behaviour, isoelectric point and electrophoresis. Preparation and reactions of α -amino acids.

Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical levels of protein structure. Protein denaturation/renaturation.

Nucleic acids: Introduction, Constituents of nucleic acids Ribonucleosides and ribonucleotides. The double helical structure of DNA.

CHEMISTRY

SEM-VI

PAPER III: PHYSICAL CHEMISTRY

Max. Marks: 35

Semester Paper=26

Internal Assessment-9

Pass Marks: 35%

Time: 3 hrs

30 Hrs (2 Hrs/Week)

3 Periods/Week

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 4 marks each. Section C will consist of 5 short answer questions that will cover the entire syllabus and will be of 2 marks each. Use of scientific non-programmable calculator is allowed.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions (Section C all questions being compulsory) selecting two questions from each of A & B Sections.

SECTION-A

I. Raman Spectrum :

15 hrs.

Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

II. Electronic Spectrum :

Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of σ , π and n M.O. their energy levels and their respective transitions.

IV. Solid State

15 hrs.

Definition of space lattice and unit cell.

Laws of crystallography-(i) Law of constancy of interfacial angles. (ii) Law of rationality of indices (iii) Law of symmetry elements in crystals.

X-ray diffraction by crystals. Derivation of Bragg's equation. Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).

SECTION-B

III. Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical process. Laws of photochemistry: Grothuss-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions- energy transfer processes (simple examples). Basic concepts of Laser and Maser. Photochemistry of vision and colour.

**B.Sc. III, Semester VI
Practical Chemistry**

Max. Marks : 45
6 Periods/Week

Time: 4 hrs

INSTRUCTIONS FOR EXAMINERS AND CANDIDATES

Candidate are required to prepare perform column Chromatography experiment and the physical experiments. The candidate will perform experiments from physical, chemistry. Distribution of marks will be as under:

1. Viva-Voce = 10
2. Note Books = 5
3. Column Chromatography = 5
4. Models = 5
5. Physical Experiments = 20* (5 for initial write up both experiments)
* (Full credit may be given for error upto 10% and one mark may be deducted for additional 5% error.)

Laboratory Techniques

1. Column Chromatography
 2. Separation of fluorescein and methylene blue.
 3. Separation of leaf pigments from spinach leaves.
 4. Physical Experiments
- (a) To determine the strength of the given acid conductometrically using standard alkali solution.
 - (b) To determine the solubility and solubility product of a given sparingly soluble electrolyte conductometrically.
 - (c) To study the saponification of ethyl acetate conductometrically.
 - (d) To determine the ionisation constant of a weak acid conductometrically.
 - (e) To determine the strength of the given acid solution pH- metrically by using standard alkali solution.
 - (f) To determine the molar refraction of methanol, ethanol and propanol.
 - (g) To study the distribution of benzoic acid between benzene and water, and ether and water.
 - (h) Knowledge of Stereochemical Study of Organic Compounds.
R and S configuration of optical isomers.
E, Z configuration of geometrical isomers.
Conformational analysis of cyclohexanes and substituted cyclohexanes.

BOOKS SUGGESTED (THEORY COURSES)

1. *Basic Inorganic Chemistry*, F.A. Cotton, G Willdson and P.L. Gaus, Wiley.
2. *Concise Inorganic Chemistry*, J.D. Lee, ELBS.
3. *Concept of models of Inorganic Chemistry*, B. Douglas, D. McDaniel, and J. Alexander, Jolin Wiley.
4. *Inorganic Chemistry*, D. E. Shriver, P. W. Atkins and C.H. Langford, Oxford.
5. *Inorganic Chemistry*, W. W. Porterfield Addison-Welsey.
6. *Inorganic Chemistry*, A. G Sharpe, ELBS
7. *Inorganic Chemistry*, G. L. Miessler and D. A. Tarr, Prentice Hall.
8. *Inorganic Chemistry*, Morrison and Boyd, Prentice-Hall.
9. *Inorganic Chemistry*, L.G Wade Jr. Prentice-Hall.
10. *Fundamentals of Organic Chemistry*, Solomons, John Wiley.
11. *Organic Chemistry*, Vol. I, II & III, S.M. Mukherji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd. (New Age International).
12. *Organic Chemistry*, F.A Carey, McGraw-Hill, Inc.
13. *Introduction to Organic Chemistry*, Streitwieser, Heathcock and Kosover and Kosover, Macmillan.
14. *Physical Chemistry*, G.M. Barrow, International Student edition, McGraw Hill.
15. *University General Chemistry*, C.N.R. Rao. Macmillan.
16. *Physical Chemistry*, R.A Alberty, Wiley Eastern Ltd.
17. *The Elements of Physical Chemistry*, P. W. Atkins, Oxford.
18. *Physical Chemistry Through Problems*, S.K. Dogra and S. Dogra, Willey Eastern Ltd.
19. *Fundamentals of Photochemistry*, Rohtga and Mukherji.

BOOKS SUGGESTED (LABORATORY COURSES)

1. *Vogel's Qualitative Inorganic Analysis*, revised, Svehla, Orienl P Longman.
2. *Vogel's Text book of Quantitative Inorganic Analysis* (revised), J.Bassett, R. C. Denney, G.H. Jeffery and J. Mendham, ELBS.
3. *Standard Methods of Chemical Analysis*, W. W. Scott, The Technical Press.
4. *Experimental Inorganic Chemistry*, W. G. Palmer, Cambridge.
5. *Handbook of Preparative Inorganic Chemistry*, Vol. I & II, Brauer, Academic Press.
6. *Inorganic Synthesis*, Mc-Graw Hill.
7. *Experimental Organic Chemistry*, Vol. I & II, P. R. Singh, D.S. Gupta, and Bajpai, Tata Mc-Graw Hill.
8. *Laboratory Manual In Organic Chemistry*, R. K. Bansal, Wiley Eastern.
9. *Vogel's Textbook of Practical Organic Chemistry*, B. S. Furniss, Al Hannaford, V. frogs, P.W.G. Smith and AR. Tatchell, ELBS
10. *Experiments in General Chemistry*, C.N.R. Rao and U.C. Agarwal, East-West Press.
11. *Experiments in Physical Chemistry*, R.C. Das, and B. Behra, Tata Mc-graw Hill.
12. *Advanced Practical Physical Chemistry*, J.B. Yadav, Goel Publishing House.
13. *Advanced Exp. Chemistry*, Vol. I-Physical, J.N. Gurutu and R. Kapoor, S. Chand & Co.
14. *Selected Exp. in Physical Chemistry*, N.G. Mukherjee, J.N. Ghose & Sons.
15. *Exp. in Physical Chemistry*, J.C. Ghosh, Bharti Bhavan.

SYLLABUS

B.Sc. (Botany) Part-III (Semester-V and VI)
(Session 2022-23 and 2023-24)

Semester-V

| THEORY | |
|---|---|
| External Marks | Internal Assessment |
| BOTB3101T: Plant Physiology | 15 (Attendance: 3 + Assignment: 6 + House Test 6) |
| BOTB3102T: Plant Growth, Development and Biotechnology | 15 (Attendance: 3 + Assignment: 6 + House Test 6) |

PRACTICAL (BOTB3101L)

| | |
|---|------------------|
| Pertaining to Theory Paper BOTB3101T: | 40 |
| Pertaining to Theory Paper BOTB3102T: | - |
| Total Marks (Semester-V) | |
| Theory | 80 Marks |
| Practical | 40 Marks |
| Internal Assessment Pertaining to Theory Paper BOTB3101T & BOTB3102T | 30 Marks |
| Total | 150 Marks |

Semester-VI

| THEORY | |
|-------------------------------------|---|
| External Marks | Internal Assessment |
| BOTB3203T: Plant Ecology | 15 (Attendance: 3 + Assignment: 6 + House Test 6) |
| BOTB3204T: Plant Utilization | 15 (Attendance: 3 + Assignment: 6 + House Test 6) |

PRACTICAL (BOTB3202L)

| | |
|---|------------------|
| Pertaining to Theory Paper BOTB3203T: | 40 |
| Pertaining to Theory Paper BOTB3204T: | |
| Total Marks (Semester-VI) | |
| Theory | 80 Marks |
| Practical | 40 Marks |
| Internal Assessment Pertaining to Theory Paper BOTB3203T & BOTB3204T | 30 Marks |
| Total | 150 Marks |

Note:

- The number of teaching hours per week will be **four and half** for each theory paper and **three** for each practical in **every semester**. In all, there will be **15 teaching hours per week** covering both theory and practical requirements. (**Nine** teaching hours for theory and **Six** teaching hours for practical per week)
- Practical paper in each semester will be of 3 hours. The timing of practical examination will be 9.00 am to 12.00 noon.




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**B.Sc. (Botany) Part-III (SEMESTER-V)
BOTB3101T: PLANT PHYSIOLOGY**

Max. Marks: 55 marks

Total Teaching hours: 45

Pass Marks: 35% in Theory and Practical Separately

Time Allowed: 3 Hours

Theory Paper: 40 marks

Internal Assessment: 15 marks

Objective of the paper is to impart knowledge to students about the functional aspects of plant metabolism in relation to its dynamic environment.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions (8-10 lines) of 2 marks each which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION-A

1. Plant-water relations: Importance of water to plant life; diffusion and osmosis; absorption, transport of water in plants uptake and transpiration; mechanism of stomatal opening and closing.
2. Mineral nutrition: Essential macro- and micro- elements and their role; mineral uptake; deficiency and toxicity symptoms.
3. Transport of organic substances: Mechanism of phloem transport; source-sink relationship; factors affecting translocation.
4. Basics of enzymology: Discovery and nomenclature; characteristics of enzymes; concepts of holoenzyme, apoenzyme, coenzyme and cofactors; mechanism of action; regulation of enzyme activity.

SECTION-B

5. Photosynthesis: Significance; historical aspects; photosynthetic pigments; action spectra and enhancement effect; concept of two photosystems; Z-scheme; photophosphorylation; Calvin cycle; C₄ pathway; CAM plants; photorespiration.
6. Respiration: ATP- the biological energy currency; aerobic and anaerobic respiration; Krebs' cycle; electron transport mechanism (chemi-osmotic theory) redox potential; oxidative phosphorylation; pentose phosphate pathway.
7. Nitrogen Fixation : Symbiotic and Asymbiotic, Nitrogen fixation, Mechanism of Nitrogen fixation; mechanism of nodule formation, Assimilation of fixed Nitrogen.
8. Lipid : Structure and function of lipids; β - oxidation.

RECOMMENDED READINGS

1. Dennis, D.T., Turpin, D.H., Lefevre, D.D. and Layzell, D.B.(eds.) 1997, *Plant Metabolism* (2nd Edition), Longman, Essex, England.
2. Galston, A.W., 1989. *Life Processes in Plants*. Scientific American Library, Springer, Verlag, New York, USA.

Handwritten signatures and initials:
A large blue signature on the left.
A blue signature in the middle.
A blue signature on the right.
A blue signature on the far right.

3. Heldt, H.2003. *Plant Biochemistry*. Academic Press, Indian Edition, Reed Elsevier India Pvt. Ltd., New Delhi.
4. Hopkins, W.G. 1999, *Introduction to Plant Physiology* (2nd Edition). John Wiley & Sons, Inc., New York, USA.
5. Lea, P.J. and Leegood, R.C. 1999, *Plant Biochemistry and Molecular Biology*. John Wiley & Sons, Chichester, England.
6. Mohr, H. and Schopfer, P. 1995, *Plant Physiology*. Springer Verlag, Berlin, Germany.
7. Salisbury, F.B. and Ross, C.W. 2005, *Plant Physiology* (4th Edition). Eastern Press Bangalore, Pvt. Ltd.
8. Tiaz, I and Zeiger, E. 2006, *Plant Physiology* (4th Edition) Sinauer Associates, Inc., Publishers, Massachusetts, USA.

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Punjab

BOTB3102T : PLANT GROWTH, DEVELOPMENT AND BIOTECHNOLOGY

Max. Marks: 55 marks
Pass Marks: 35% in Theory and Practical Separately
Theory Paper: 40 marks
Internal Assessment: 15 marks

Total Teaching hours: 45
Time Allowed: 3 Hours

Objective of the paper is to impart knowledge to students about the different technologies in biology of plants to understand its growth, growth kinetics and effect of light on germination and growth of seed and seedling under different environments.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions (8-10 lines) of 2 marks each which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION-A

1. Growth: phases of growth, growth kinetics; plant hormones: discovery, bioassay, physiological effects and application of auxins, gibberellins, cytokinins, abscisic acid and ethylene.
2. Photomorphogenesis: discovery, structure, physiological role and mechanism of action of phytochrome and cryptochrome.
3. Photoperiodism, vernalization, biological clocks, physiology of senescence and abscission.
4. Physiology of seed dormancy and seed germination; plant movements.

SECTION-B

5. Tools and techniques of recombinant DNA technology with special reference to restriction enzymes, gel electrophoresis, Southern blotting, cloning vectors and PCR. Genomic and cDNA library.
6. Methods of G transfer in plants : physical, chemical and biological methods.
7. Basic concept of plant tissue, culture, totipotency, micropropagation, anther culture, embryo culture, synthetic seeds and somatic hybridization.
8. Plant Biotechnology and its application in human welfare with particular reference to industry, agriculture and molecular farming.

RECOMMENDED READINGS

1. Bhojwani, S.S. 1990, *Plant Tissue Culture: Applications and Limitations*, Elsevier Science Publishers, New York, USA.
2. Hopkins, W.G. 1999, *Introduction to Plant Physiology* (2nd Edition), John Wiley & Sons, Inc., New York, USA.
3. Purohit, S.S. 2005, *Biotechnology: Fundamental and Applications*, Agrobios, India.
4. Gupta P.K. 2004. *Biotechnology and Genomics*. Rastogi Publications, Meerut, India.
5. Singh D.B. 2008. *Biotechnology: Expanding Horizons*, Kalyani Publishers, India.
6. Mohr, H. and Schopfer, P. 1995. *Plant Physiology*. Springer Verlag, Berlin, Germany.
7. Old, R.W. and Primrose, S.B. 1989, *Principles of Gene Manipulation*. Blackwell Scientific Publications, Oxford, UK.



8. Raghavan, V. 1986. *Embryogenesis in Angiosperms: A Developmental and Experimental Study*. Cambridge University Press, New York, USA.
9. Salisbury, F.B. and Ross, C.W. 2005, *Plant Physiology* (4th Edition). Eastern Press Bangalore, Pvt. Ltd.
10. Srivastava, L.M. 2005. *Plant Growth and Development. Hormones and Environment*. Academic Press, USA.
11. Tiaz, I and Zeiger, E. 2006. *Plant Physiology* (4th Edition) Sinauer Associates, Inc., Publishers, Massachusetts, USA.
12. Vasil, I.K. and Thorpe, T.A. 1994. *Plant Cell and Tissue Culture*. Kluwer Academic Publishers, The Netherlands.






SUGGESTED LABORATORY EXERCISES (Pertaining to theory paper BOTB3101T & BOTB3102T)

1. To study the permeability of plasma membrane using different concentrations of organic solvents.
2. To study the effect of temperature on permeability of plasma membrane.
3. To study the enzyme activity of catalase and peroxidase.
4. To demonstrate of the rate of respiration of various plants.
5. Separation of chloroplast pigments by solvent method.
6. Demonstration of the osmotic potential of vacuolar sap by plasmolytic method.
7. Demonstration of the water potential of any tuber.
8. Separation of amino acids in the mixture by paper chromatography and their identification by comparison with standard.
9. Demonstration of the technique of micropropagation by using different explants e.g. auxiliary buds, shoot meristems.
10. Demonstration of the techniques of anther culture.
11. Isolation of protoplasts from different tissues using commercially available enzymes (Demonstration only).
12. Demonstration of root and shoot formation from the apical and basal portion of stem segments in liquid medium containing different hormones.
13. Preparation of synthetic seeds in potato and sugarcane.
14. Separation of proteins of a given sample through Gel Electrophoresis.
15. Demonstration of necessity of light, CO₂, and Chlorophyll for photosynthesis.
16. Demonstration of rate of transpiration by Ganong's apparatus.
17. Comparison of loss of water from two surfaces of leaf by 4 leaf method.
18. Demonstration of path of Ascent of sap by eocin ringing experiment.
19. Demonstration of phototropism and geotropism.
20. Demonstration of the presence of reducing sugars, fats and proteins in plant tissue by micro-chemical tests.
21. To determine the seed viability through Triphenyl Tetrazolium chloride and actual germination Tests.

SUGGESTED READINGS FOR LABORATORY EXERCISES

1. Devi, P. 2000. *Principles and Methods of Plant Molecular Biology, Biochemistry and Genetics*.
2. Dixon, R.A. (Ed.) 1987. *Plant Cell Culture. A Practical Approach*. IRL Press, Oxford.
3. Glick, D.R. and Thompson, J.E. 1993. *Methods in Plant Molecular Biology and Biochemistry*. CRC Press, Boxaraton, Florida.
4. Hall, R.D. (Ed.) 1999. *Plant Cell Culture Protocols*. Humana Press, Inc., New Jersey, USA.
5. Moore, T.C. 1974. *Research Experiences in Plant Physiology: A Laboratory Manual*. Springer-Verlag, Berlin.
6. Ninfa, A.J. and Ballou, D.P. 1998. *Fundamental Laboratory Approaches for Biochemistry and Biotechnology*. Fitzgerald Science press, Inc. Maryland, USA.
7. Roberts, J. and Tucker, G.A. (Eds.) 2000. *Plant Hormone Protocols*. Humana Press, Inc. New Jersey, USA.
8. Scott, R.P.W. 1995. *Techniques and Practice of Chromatography*. Marcel Dekker, Inc., New York.
9. Smith, R.H. 2000. *Plant Tissue Culture: Techniques and Experiments*. Academic Press, New York.
10. Wilson, K. and Goulding, K.H. (Eds.) 1986. *A Biologists Guide to Principles and Techniques of Practical Biochemistry*. Edward Arnold, London, UK.



INSTRUCTIONS FOR PAPER SETTER
PRACTICAL PAPER-V (PERTAINING TO THEORY PAPER- IX & X)

| | Marks |
|--|-----------------|
| 1) Write up about the requirements, principle procedure and precautions of a minor experiment. Also perform the experiment. | 08 |
| 2) Write up about the requirements, principle, procedure and precautions of a major experiment. Also perform the experiment. | 10 |
| 3) Comment upon the experiment set | 04 |
| 4) Comment upon the experiment/apparatus/culture tube/material. | 04 |
| 5) Write up about technique used for another culture/Micropropagation /isolation of protoplast etc. | 04 |
| 6) Viva-Voce | 05 |
| 7) Note Book | 05 |
| | <hr/> |
| | <u>40 Marks</u> |

5/10/23
Dr. J. K. Singh

BOTB3203T : PLANT ECOLOGY

Max. Marks: 55 marks

Total Teaching hours: 45

Pass Marks: 35% in Theory and Practical Separately

Time Allowed: 3 Hours

Theory Paper: 40 marks

Internal Assessment: 15 marks

Objective of the paper is to make the students conversant with the basic concepts of Ecology and make them aware of the various Environmental issues.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions (8-10 lines) of 2 marks each which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION-A

1. Concept of ecology and its scope. Environmental factors: climatic, edaphic, topographic and biotic, Shelford's law of tolerance.
2. Population ecology: Characteristics, positive and negative interaction, growth forms, carrying capacity, ecotypes and ecads.
3. Community ecology: Community characteristics, frequency, density and abundance, cover, life forms, ecological succession (Hydroseres, Xeroseres), Gause principle of competitive exclusion.
4. Structure and concept of ecosystem, ecological pyramids, food chain, food web, ecological energetics, ecological productivity.

SECTION-B

5. Environmental issues: Brief idea of air, water, noise and soil pollution. Global warming and ozone depletion. International efforts for mitigation of global climate change.
6. Biodiversity: Introduction and Importance of Biodiversity; Elements of Biodiversity; Genetic, species and ecological diversity. Conservation strategies, concept of hot spots, biomes, phytogeographic regions of India, vegetation types (Forests, Grasslands, Desserts and Wetlands).
7. Ecological adaptations in xerophytes, hydrophytes and halophytes.
8. Biogeochemical cycles with particular reference to C, N and P.

RECOMMENDED READINGS

1. Begon, M., Townsend, C.R. & Harper, J.L. 2006. *Ecology: From Individuals to Ecosystems* (4th Edition) Blackwell Publishers, Australia.
2. Gurevitch, J., Scheiner, S.M. and Fox, G.A. 2006. *The Ecology of Plants* (2nd Edition), Sinauer Associates Inc, Pub. USA.
3. Komondy, E.J. 1996. *Concepts of Ecology*. Prentice-Hall of India Pvt. Ltd., New Delhi.
4. Mackenzie, A. et al. 1999. *Instant Notes in Ecology*. Viva Books Pvt. Ltd., New Delhi.
5. Mckmney, M.L., Schoch, R.M. & Yonaujak, L. 2007. *Environmental Science: Systems and Solutions* (4th Edition). Jones and Bartl. Pub., USA.
6. Odum, E.P. 1983. *Basic Ecology*. Saunders, Philadelphia.
7. Omasa, K. Saiji, H., Youssetian, S. and Kondo, N. 2005. *Air pollution and Plant Biotechnology: Prospects for Phytomonitoring and Phytoremediation*. Springer-Verlog, Tokyo, Japan.

BOTB3204T: PLANT UTILIZATION

Max. Marks: 55 marks

Total Teaching hours: 45

Pass Marks: 35% in Theory and Practical Separately

Time Allowed: 3 Hours

Theory Paper: 40 marks

Internal Assessment: 15 marks

Objective of the paper is to impart knowledge to students about the plant resources useful to mankind.

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions (8-10 lines) of 2 marks each which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION-A

1. The importance and nature of plant products; fibres: surface fibres (cotton), soft fibres (Jute), hard fibres (Coir). Forest products: Wood, properties, seasoning and importance, important timber plants of India.
2. Brief history of origin of food plants; cultivation practice and recommended varieties of wheat, rice, maize and sugarcane with particular reference to Punjab.
3. Cultivation practices and use of soyabean, sunflower, mustard, groundnut and coconut.
4. Vegetables and Fruits: Botanical name, family, season and area of cultivation of potato, tomato, brinjal, carrot, ladyfinger, pea, mango, apple, banana, guava, kinnow and grapes.
5. Spices: General account pertaining to botanical name, family and part used in case of clove, cardamom, black pepper, turmeric, cumin and ginger.
6. Medicinal Plants: General account pertaining to botanical name, family, part used and active principle in case of belladonna, neem, tulsi, stevia, rauwolfia, ashwagandha and glycyrrhiza.
7. Beverages and Narcotics: Cultivation practices, botanical name, family and active ingredients of tea and coffee; Cannabis, tobacco and opium.
8. Rubber: Major sources, cultivation, processing and uses of Para rubber.

SECTION-B

- RECOMMENDED READINGS**

1. Kochuar, S.L., 1998. *Economic Botany in Tropics*, 2nd Edition, Mac Millan India Ltd., New Delhi.
2. Sambamurthy, A.V.S.S. and Subramanyam, N.S. 1989. *A Textbook of Economic Botany*, Wiley Eastern Ltd., New Delhi.
3. Sharma, O.P. 1996. *Hill's Economic Botany* (Late Dr. A.F. Hill, adapted by O.P. Sharma) Tata McGraw Hill Co. Ltd., New Delhi.
4. Simpson, B.B. and Conner, M. 1986. *Economic Botany – Plants in Our World*, McGraw Hill, New York.

SUGGESTED LABORATORY EXERCISES PERTAINING TO THEORY PAPERS: PLANT ECOLOGY AND PLANT UTILIZATION:

Teachers may select plant/material available in their locality/institution.

1. To determine minimum number of quadrats required for study of a grassland.
2. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkiaer's Standard Frequency Diagram.
3. To estimate Importance Value Index (IVI) for grassland species on the basis of relative frequency, relative density and relative biomass in protected and grazed grassland.
4. To measure the above ground plant biomass in a grassland.
5. To determine Kemp's constant for dicot and monocot leaves and to estimate the leaf area index of a grassland community.
6. To determine diversity indices (Richness, Simpson, Shannon Wiener) in grazed and protected grassland.
7. To estimate bulk density and porosity of grassland and woodland soil.
8. To determine moisture content and water holding capacity of grassland and woodland soil.
9. To study the vegetation structure through profile diagram.
10. To estimate transparency, pH and temperature of different water bodies.
11. To measure dissolved oxygen content in polluted and unpolluted water samples.
12. To estimate salinity of different water samples.
13. To determine the per cent leaf area injury of different leaf samples collected around polluted sites.
14. To demonstrate dust holding capacity of the leaves of different plant species.
15. Food Plants: Study of the morphology, structure and simple micro chemical tests of the food storing tissues in rice, wheat, maize, potato and sugarcane. Microscopic examination of starch in these plants (excepting sugarcane).
16. Fibres: Study of cotton flower, sectioning of the cotton ovules/developing seeds to trace the origin and development of cotton fibres. Microscopic study of cotton and test for cellulose. Sectioning and staining of jute stem showing the location and development of fibres. Microscopic structure. Tests for ligno-cellulose.
17. Vegetable Oils: study of hand sections of groundnut, mustard and coconut and staining of oil droplets with Sudan III and Sudan Black.
18. Field Visits: To study sources of firewood (10 plants), timber-yielding trees (10 trees) and bamboos. A list to be prepared mentioning special features.
19. Spices: Examine Black pepper, cloves, cinnamon (hand sections) and open fruits of cardamom and describe them briefly.
20. Preparation of an illustrated inventory of 10 medicinal plants and use their in indigenous systems of medicine of allopathy: Write their botanical and common names, parts used and diseases/disorders for which they are prescribed.
21. Beverages: Section of boiled coffee beans and tea leaves to study the characteristic structural features.





**SUGGESTED READINGS FOR LABORATORY EXERCISES IN PLANT ECOLOGY
AND PLANT UTILIZATION**

1. APHA- *Standard Methods for the Examination of Water and Waste Water*. American Public Health Association, Washington, D.C.
2. Krebs, C.J. 1989. *Ecological Methodology*. Harper and Row, New York, USA.
3. Ludwig, J.A. and Reynolds, I.F. 1988. *Statistical Ecology*. Wiley, New York.
4. Misra, R. 1968. *Ecology Work Book*. Oxford & IBH, New Delhi.
5. Moore, P.W. and Chapman, S.B. 1986. *Methods in Plant Ecology*. Blackwell Scientific Publication.
6. Council of Scientific & Industrial research 1986. *The Useful Plants of India*. Publication and Information Directorate, CSIR, New Delhi.
7. Kochhar, S.L. 2000. *Economic Botany of the Tropics*. Macmillan India Pvt.Ltd., New Delhi.
8. Pimentel, D. and Hall, C.W.(Eds.) 1989. *Food and Natural Resources*. Academic Press, London, New York.
9. Swaminathan, M.S. and Kochhar, S.L. (Eds.) 1989. *Plants and Society*. Macmillan Publication Ltd., London.

**INSTRUCTIONS FOR PAPER SETTER
PRACTICAL PAPER-VI (PERTAINING TO THEORY XI & XII)**

| | Marks |
|---|---|
| 1) Section cutting and preparation of slide of any economically important plant/part and show to the examiner | 06 |
| 2) Write up about the requirements, procedure and precautions for an ecological experiment | 05 |
| 3) Write up about the requirements, principle and procedure of anyecological experiment. Show results to the examiner | 06 |
| 4) Identification of four spots/specimens/slides giving at least two reasons. | 08 |
| 5) Field Report | 05 |
| 6) viva-voce | 05 |
| 7) Note Book | 05 |
| | <hr style="width: 10%; margin-left: auto; margin-right: 0;"/> |
| | <u>40 Marks</u> |

S.P.
OK
Arvind
P

**PUNJABI UNIVERSITY, PATIALA 1470
02 (INDIA)**

(Established under Punjab Act No. 35 of 1961)



Faculty of Life Sciences

Outline of Course and Syllabi for

B.Sc. Zoology III (Semester V & VI)

Sessions: 2022-23, 2023-24 and 2024-25

Meat

Shree

SYLLABUS

B.Sc. (Zoology) Part-III (Semester-V and VI)
(Session 2022-23, 2023-24 and 2024-25)

Semester-V

THEORY

| | |
|-----------------------|----------------------------|
| External Marks | Internal Assessment |
|-----------------------|----------------------------|

| | | |
|---|----|---|
| Paper-IX : Molecular Biology (ZOO 301) | 40 | 15 (Attendance: 3 + Assignment: 6 + House Test 6) |
|---|----|---|

| | | |
|--|----|---|
| Paper- X: Developmental Biology (ZOO 302) | 40 | 15 (Attendance: 3 + Assignment: 6 + House Test 6) |
|--|----|---|

PRACTICAL

| | |
|---|----|
| Pertaining to Theory Paper-IX and Theory Paper-X: | 40 |
|---|----|

Total Marks (Semester-V)

| | |
|---|------------------|
| Theory | 80 Marks |
| Practical | 40 Marks |
| Internal Assessment pertaining to Theory Paper IX & X | 30 Marks |
| Total | 150 Marks |

Semester-VI

THEORY

| | |
|-----------------------|----------------------------|
| External Marks | Internal Assessment |
|-----------------------|----------------------------|

| | | |
|-----------------------------|----|---|
| Paper-XI : Paper-XII : | 40 | 15 (Attendance: 3 + Assignment: 6 + House Test 6) |
| Applied Zoology (3 Options) | 40 | 15 (Attendance: 3 + Assignment: 6 + House Test 6) |

Option I : Zoo.303 Paper-XI Medical Zoology and Medical Laboratory Technology
: Zoo.304 Paper-XII Immunology

Option II : Zoo.305 Paper-XI Insect Biology
: Zoo.306 Paper-XII Economic Entomology and Pest Management

Option III : Zoo.307 Paper-XI Aquaculture-I
: Zoo.308 Paper-XII Aquaculture-II

PRACTICAL

| | |
|--|----|
| Pertaining to Theory Paper-XI and Theory Paper-XII : | 40 |
|--|----|

Total Marks (Semester-VI)

| | |
|---|------------------|
| Theory | 80 Marks |
| Practical | 40 Marks |
| Internal Assessment pertaining to Theory Paper XI & XII | 30 Marks |
| Total | 150 Marks |

Note:

- 1) The number of teaching hours per week will be three for each theory paper and three for each practical in every semester. In all, there will be 12 teaching hours per week covering both theory and practical requirements. (Six teaching hours for theory and Six teaching hours for practical per week)
- 2) There will be one Practical paper of 3 hours pertaining to the theory papers in each semester. The timing of practical examination will be 9.00 am to 12.00 noon.

SEMESTER-V
MOLECULAR BIOLOGY (ZOO 301)
PAPER-IX

Max. Marks: 55

Pass marks: 35%

Theory-40

Internal Assessment: 15

Time Allowed: 3 hours

Lectures to be delivered: 45

(Each of 45 minutes duration)

INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

Section-A

1. The nature of genetic material: DNA Structure, Watson and Crick-model, Polymorphism of DNA Helix.
2. Replication of DNA: Enzymes and mechanism involved in DNA replication (prokaryotes and eukaryotes), DNA damage and repair.
3. Transcription: Mechanism of Transcription in Prokaryotes and Eukaryotes.
4. RNA Processing: Concept of introns and exons, spliceosome machinery and splicing pathways.

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Section-B

5. Translation (Prokaryotes and Eukaryotes): Various steps and mechanism involved in protein synthesis.
6. Transcription Regulation: Principles of transcriptional regulation in prokaryotes with examples from *lac* and *trp* operons. Transcription Regulation in Eukaryotes.
7. Recombinant DNA technology: Introduction to the concept of Recombinant DNA Technology: Enzymes involved, vectors, transformation techniques (microbial), Construction and screening of DNA libraries.
8. Application of recombinant DNA technology: Application in medicine: vaccines, detection of genetic diseases (Sickle cell anemia), gene therapy.

SUGGESTED READINGS

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments, 6th edition. John Wiley & Sons, Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
4. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., 2008 Molecular Biology of the Gene 6th edition. Cold Spring Harbour Lab. Press, Pearson Pu

DEVELOPMENTAL BIOLOGY (ZOO 302)
PAPER-X

Max. Marks: 55

Pass marks: 35%

Theory-40

Internal Assessment: 15

Time Allowed: 3 hours

Lectures to be delivered: 45

(Each of 45 minutes duration)

INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION-A

1. Introduction

Historical perspective and basic concepts: Phases of development, Cell-Cell interaction, Pattern formation, Differentiation and growth, Differential gene expression, Cytoplasmic determinants and asymmetric cell division
Implications of Developmental Biology: Teratogenesis: Teratogenic agents and their effects on embryonic development.

2. Early Embryonic Development

Gametogenesis: Spermatogenesis, structure of sperm, variations in sperm structure, significance of spermatogenesis. Oogenesis, structure and functions of egg, Vitellogenesis, functions of yolk, Types of eggs, Egg membranes; Fertilization: mechanism and significance of fertilization, Monospermy and polyspermy, Blocks to polyspermy; Planes and patterns of cleavage; Morula and morulation, Blastula and blastulation, Types of Blastula.

3. Late Embryonic Development

Development of frog and chick upto gastrulation; Morphogenetic movements: Types and examples. Organizer: Spemann-Mangold organiser experiment; concept of induction, determination, and differentiation Fate of Germ Layers

SECTION-B

4. Extra-embryonic membranes; Implantation of embryo in humans, Placenta (Structure, physiology, types and functions of placenta)

5. Post Embryonic Development

Metamorphosis: Changes, hormonal regulations in amphibians and insects; Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each); Ageing: Concepts and Theories.

6. Control of Development: Fundamental processes in development (brief idea) – Gene activation, determination, induction, Differentiation, morphogenesis, intercellular communication, cell movements and cell death

SUGGESTED READINGS

1. Gilbert, S.F. and Barresi, M. J.F. (2016.) Developmental Biology. 11th Edition. ISBN No.-9781605354705.
2. Balinsky, B. I. (2012). An Introduction to Embryology. 5th Edition. ISBN No.-9788131517499.
3. Carlson, B.M. (2014). Patten's Foundations of Embryology. (2014) 6th Edition. ISBN No.-9780072871708.

4. Kalthoff, K. O. (2000). Analysis of Biological Developmental. 2nd Edition. ISBN No.-9780070920378.
5. Wolpert, L. (2015). Principles of Development. 5th Edition. ISBN No.-9780198709886.

Practical Based on Theory Paper

Zoo 301 & 302

1. Study of the development of frog from permanent slides.
2. Study of the development of chick embryo form permanent slides upto 96 hours.
3. Study of the following prepared slides:
 - a) Stages of gametogenesis, structure of egg and sperm of a mammal.
 - b) Larva of *Herdmania*, Frog
4. Study of different sections of placenta (photomicrograph/ slides), Study of effect of teratogens on development through photographs
5. Isolation of DNA
6. Quantitative estimation of DNA using spectrophotometer
7. Separation of DNA by Electrophoresis and visualisation through Gel Documentation
8. Demonstration of DNA replication using PCR
9. Study and interpretation of electron micrographs/ photograph showing
 - a) DNA replication
 - b) Transcription
 - c) Split genes
10. Numerical Problems on Genetic Code
11. Visit to Molecular research Lab

Guidelines for the conduct of Practical Examination

Max. Marks: 40

Pass Marks: 35%

Time Allowed: 3 hours

- | | |
|---|----|
| 1. Write the procedure and explain the Molecular biology experiment no. 5-8 | 6 |
| 2. Numerical problem on genetic code | 4 |
| 3. Identify the given micrograph for Replication/Transcription/ Split genes and write a short note on it. | 5 |
| 4. Identify the slides/photographs A to E (development biology/Placenta/Effect of teratogens) giving two reasons for each identification. | 10 |
| 5. Practical Note Book | 5 |
| 6. Viva-voce | 5 |
| 7. Molecular Lab visit Report | 5 |

SEMESTER-VI
APPLIED ZOOLOGY
Option I : MEDICAL ZOOLOGY AND MEDICAL LAB TECHNOLOGY (ZOO 303)
PAPER-XI

Max. Marks: 55

Pass marks: 35%

Theory- 40

Internal Assessment: 15

Time allowed: 3 hours

Lectures to be delivered: 45

(Each of 45 minutes duration)

INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION - A

1. Introduction to Parasitology (pertaining to various terminologies in use).
2. Brief accounts of life history, mode of infection and pathogenicity of the following pathogens with reference to man; prophylaxis and treatment:
 - a) Pathogenic protozoans: *Entamoeba*, *Trypanosoma*, *Leishmania*, *Giardia*, *Trichomonas* and *Plasmodium*.
 - b) Pathogenic helminthes: *Fasciolopsis*, *Schistosoma*, *Echinococcus*, *Ancylostoma*, *Trichinella*, *Wuchereria*, *Dracunculus* and *Oxyuris*.
4. Life cycle and control measures of arthropod vectors of human diseases : Malaria (*Anopheles*) Yellow fever and Dengue, Haemorrhagic fever (*Aedes*); Filariasis and Japanese Encephalitis (*Culex*).

SECTION-B

1. Laboratory techniques: Colorimetry, Microscopy, Autoclaving, Centrifugation, Spectrophotometry.
2. Haematology: Collection of blood (Venous and Capillary), Anticoagulants (meris and demeris). Romanowsky's stains. Total RBC count, Erythrocyte sedimentation rate, TLC, DLC, Eosinophil count, Platelet count, Reticulocyte count.
3. Biochemistry: Protein estimation, estimation of blood urea, sugar and cholesterol, serum creatinine and uric acid, urine analysis; estimation of protein, sugar, bile salts, bile pigments, ketone bodies; enzyme studies (serum transaminase, phosphatase, amylase and lipase), liver function test.

4. Histopathology: Common fixatives and staining techniques, Histochemistry : Principle and method : Staining of carbohydrates, proteins and fats with bromo phenol blue, Periodic acid Schiff, Sudan Black blue and Feulgen reaction.

APPLIED ZOOLOGY

**Option I : IMMUNOLOGY (ZOO 304)
PAPER-XII**

Max. Marks: 55

Pass marks: 35%

Theory- 40

Internal Assessment: 15

Time allowed: 3 hours

Lectures to be delivered: 45

(Each of 45 minutes duration)

INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION - A

1. Immunity: Basic concept of Innate and adaptive Immunity; active and passive immunity.
2. Overview of cells and organs of the immune system.
3. Immunoglobulins: Basic structure, structure and function of different classes of immunoglobulins.
4. Antigens: Antigen types and properties. Antigen- Antibody interaction.
5. Immunoassays (IFA, ELISA and RIA).

SECTION - B

6. Major Histocompatibility complex: General organization, structure of class I and class II MHC molecule.
7. Cytokines: Properties and functions.
8. Complement System: Function, Complement activation: classical and alternative pathways.
9. Hypersensitivity: Types and mechanism.
10. Autoimmunity: Definition and mechanisms.
11. Vaccines: Active and passive immunization, vaccines (live, attenuated, inactivated and DNA vaccines).

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Practical Based on Theory Paper

ZOO 303 & 304

1. Demonstration of safety rules in laboratory like proper handling of patients, specimens and disposal of syringes, needles etc.
2. Demonstration of the use of autoclave, centrifuge and spectrophotometer.
3. Estimation of haemoglobin using Sahli's haemometer.
4. Counting of WBC, RBC & DLC.
5. Study of permanent slides and specimens of parasite protozoans, helminthes, arthropods, mentioned in theory syllabus.
6. Analysis of blood groups A, B, AB, O and Rh.
7. ESR, haematocrit, bleeding time, coagulation time, prothrombin time.
8. Demonstration of Fixation, embedding, cutting of tissue sections and their staining (routine Haematoxyline and Eosin stain).
9. Histological study of lymphoid organs.
10. Demonstration of ELISA.
11. Study of autoimmune diseases through pictures.

SUGGESTED READINGS

1. Baker F.J. and Silverton, R.E. Introduction to Medical Laboratory Technology, 6th edition. Butterworth and Co. Ltd.. 1985.
2. Cheesborough, M. Medical Laboratory technology for Tropical countries, 2nd edition, Butterworth and Co. Ltd., 1987.
3. Talib, V.H., Essential Laboratory Manual, Mehta Publishers, New Delhi, 1999.
4. Kube, J., Immunology, W.H. Freeman & Co., USA, 2000.
5. Chatterjee, K.D., Parasitology, Protozoology and helminthology, 12th edition, 1995.
6. Garcia, L.S., Diagnostic Medical Parasitology, 4th edition, ASM Press Washington, 2001.

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APPLIED ZOOLOGY
Option II : INSECT BIOLOGY (ZOO 305)
PAPER-XI

Max Marks: 55

Pass marks: 35%

Theory- 40

Internal Assessment: 15

Time allowed: 3 hours

Lectures to be delivered: 45

(Each of 45 minutes duration)

INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

SECTION - A

1. Introduction: General Features of Insects, Distribution and Success of Insects on the Earth
2. Insect Taxonomy: Basis of insect classification; Classification of insects up to orders
3. General Morphology of Insects: External Features; Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits; Thorax: Wings and wing articulation. Types of Legs adapted to diverse habitat; Abdominal appendages and genitalia

SECTION- B

4. Physiology of Insects: Structure and physiology of Insect body systems - Integumentary, digestive, excretory, circulatory, respiratory, endocrine, reproductive, and nervous system, Sensory receptors
5. Development of insects: Growth , Metamorphosis: Types and Hormonal control, Types of larvae, Types of pupae
6. Insect Society: Social organization and social behaviour in honeybee, ants and termites
7. Insects as Vectors: Systematic position, diseases spread by and control of insect vectors belonging to Diptera, Siphonaptera, Siphunculata, Hemiptera

SUGGESTED READINGS

1. A general text book of entomology, Imms, A. D., Chapman & Hall, UK
2. The Insects: Structure and function, Chapman, R. F., Cambridge University Press, UK
3. Principles of Insect Morphology, Snodgrass, R. E., Cornell Univ. Press, USA
4. Introduction to the study of insects, Borror, D. J., Triplehorn, C. A., and Johnson, N. F., M Saunders College Publication, USA

5. The Insect Societies, Wilson, E. O., Harvard Univ. Press, UK
6. Physiological system in Insects, Klowden, M. J., Academic Press, USA
7. The Insects, An outline of Entomology, Gullan, P. J., and Cranston, P. S., Wiley Blackwell, UK
8. Insect Physiology and Biochemistry, Nation, J. L., CRC Press, USA
9. Matheson, R. : Medical Entomology, Comstock Publishing Company, Inc. (1950).

**Option II: ECONOMIC ENTOMOLOGY AND PEST MANAGEMENT (ZOO 305)
PAPER-XII**

Max. Marks: 55

Pass marks: 35%

Theory- 40

Internal Assessment: 15

Time allowed: 3 hours

Lectures to be delivered: 45

(Each of 45 minutes duration)

INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

Section: A

1. Systematic position, habits , nature of damage along with life cycle and control measures of the following pests of Sugarcane :
 - a) Sugarcane leaf hopper (*Pyrrilla perpusilla*)
 - b) Sugarcane top borer (*Scirpophaga nivella*)
 - c) Sugarcane stem borer (*Chilothea infuscatellus*)
2. Systematic position, habits , nature of damage along with life cycle and control measures of the following pests of Cotton :
 - a) Pink bollworm (*Pectinophora gossypiella*) alongwith life cycle and control measures.
 - b) Red cotton bug (*Dysdercus cingulatus*)
 - c) Cotton grey weevil (*Myliocerus maculosus*)
3. Systematic position, habits , nature of damage along with life cycle and control measures of the following pests of Paddy :
 - a) Rice Gurdhy Bug (*Leptocoris varicornis*) alongwith life cycle and control measures.
 - b) Rice grasshopper (*Hieroglyphys banian*)

- c) Rice Hispa (*Dicladispa armigera*)
4. Systematic position, habits , nature of damage along with life cycle and control measures of the following pests of Wheat :
- a) Wheat stem borer (*Sesamia inferens*) alongwith life cycle and control measures.
 - b) Termites
 - c) Aphids, Jassids
5. Systematic position, habits, nature of damage along with life cycle and control measures of the following pests of Vegetables:
- a) Red pumpkin beetle (*Aulacophora foveicollis*)
 - b) Pumpkin fruit fly (*Dacus cucurbitae*) alongwith life cycle and control measures.
 - c) Hadda beetle (*Epitachna vigintioctopunctata*)
6. Pests of Stored Grains: Systematic position, habits and nature of damage of the following pests of stored grains:
- a) Pulse Beetle (*Callosobruchus maculatus*) along with life cycle and control.
 - b) Rice weevil (*Sitophilus oryzae*)
 - c) Lesser grain borer (*Rhizopertha dominica*)

Section: B

7. Sericulture: Species of silkworm, Requirements of Sericulture Industry, Grainage Management, Pre and Post-cocoon processing, Diseases of silkworm.
8. Apiculture: Species of Honeybees, Flora for Apiculture, Methods & Appliances of Bee Keeping, Products - (a) Honey (b) Bee wax (c) Propolis (d) Pollen (e) Royal Jelly (f) Bee Venom Diseases of Honey bee
9. Lac Culture: Species of Lac Insect, Host Plants, Cultivation of Lac, Processing of Lac, Diseases.
10. Chemical Control: History; Types and Classification of Insecticides
- (a) Insecticides of plant origin with special reference to nicotine; Pyrethrum and Azadirachtin
 - (b) Chlorinated Hydrocarbon insecticides with special reference to DDT; BHC; Chlordane and Endosulfan
 - (c) Organophosphorus Insecticides with special reference to Malathion; TEPP; Parathion.
 - (d) Carbamate Insecticides with reference to Carbaryl and Carbofuran
 - (e) Fumigants with reference to Hydrogen cyanide; Methyl bromide and Aluminium phosphide.
11. Recent Methods of Pest Control: Biological Control - History; Techniques in biological control, Agents of biological Control:

(a) Vertebrates (b) Nematelminthes (c) Arthropods (d) Protozoan; Microbial control with the help of Bacteria, Virus and Fungi.

Sterile insect release methods, Behavioural control involving use of Pheromones

SUGGESTED READINGS

1. Atwal, A.S.: Agricultural Pests of India and South East Asia, Kalyani Publishers, New Delhi (1991).
2. Nair, M.R.G.K. : Insects and Mites of Crops in India, ICAR, New Delhi (1975).
3. Kumar, A. & Nigam, P.M. : Economic and Applied Entomology. Emkay Publications (1991).
4. Metcalf, R.L. & Metcalf, R.A.: Destructive and Useful Insects, McGraw Hill Book Company, Inc. New York, Toronto, London (1951).
5. Dent, D.: Integrated Pest Management, Chapman & Hal, London, New York, Tokyo, Madras (1995).
6. House, P., Sevens, I. and Jones, O.: Insect Pheromones and their use in Pest Management, Chapman & Hall, London, New York, Tokyo, Madras (1998).
7. Mishra, R.C.: Honey Bees and their Management in India, ICAR Publication New Delhi, (1995).

Practical Based on Theory Paper

ZOO 305 & 306

1. Study of mouth parts of cockroach, honey bee, housefly, butterfly and red cotton bug
2. Study of different types of larvae and pupae of insects.
3. Study of different kinds of antennae and legs
4. Study of head and sclerites of any one insect
5. Study of insect wings and their venation.
6. Methodology of collection, preservation and identification of insects.
7. Morphological studies of various castes of *Apis*, *Camponotus* and *Odontotermes*
8. External morphology and identification marks of the crops and vegetables pests: *Pyrrilla perpusilla* (Sugarcane leaf hopper), *Pectinophora gossypiella* (Pink bollworm), *Leptocorisa varicornis* (Gundhy bug) *Hieroglyphus banian* (Paddy grass hopper).

7. External morphology and identification marks of the following stored grain pests :
Stiophilus oryzae (Rice weevil), *Tribolium castaneum* (Rust red flour beetle), *Rhizopertha dominica* (Lesser grain borer/susri), *Callosobruchus maculatus* (Pulse beetle/Dhora).
8. External morphology and identification marks of the following insects of Medical importance-Mosquitoes (*Culex*, *Anopheles* and *Aedes*), house fly, blow fly, flea, louse, bed bug
9. Study of life stages of silk worm and honey bees.

APPLIED ZOOLOGY
Option III : AQUACULTURE-I (ZOO 307)
PAPER-XI

Max. Marks: 55

Pass marks: 35%

Theory- 40

Internal Assessment: 15

Time allowed: 3 hours
Lectures to be delivered: 45
(Each of 45 minutes duration)

INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

Section: A

1. History of inland fisheries in India
2. Morphology of a typical fish (carp, cat-fish, fresh water eel, perch).
3. Structure of mouth of different fishes in relation to feeding habits.
4. Identification and classification of important fishes of Punjab, Haryana & Himachal Pradesh.
5. Bionomics of

- a) *Labeo rohita*
- b) *Caatla catla*
- c) *Cirrhinus mirigala*
- d) *Wallago attu*

Section: B

Mark



6. Exotic fishes: History, their introduction, morphology, their role in fish culture, impact on native fish fauna.
7. Induced Breeding
 - a) History
 - b) Technique
 - c) Chemicals involved induced breeding impact on fish culture
8. Pond culture
 - a) Construction of pond
 - b) Types of pond
 - c) Hydrobiological factors of water and soil of a fish pond
 - d) Fertilization of pond
 - e) Maintenance of pond
9. Aquatic weeds and their control both biological and chemical.

APPLIED ZOOLOGY
Option III: AQUACULTURE-II (ZOO 308)
PAPER-XII

Max. Marks: 55

Pass marks: 35%

Theory- 40

Internal Assessment: 15

Time allowed: 3 hours

Lectures to be delivered: 45

(Each of 45 minutes duration)

INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions which will cover the entire syllabus uniformly and will carry 16 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

Section: A

1. Riverine fisheries of river Sutlej and Beas.
2. Reservoir fisheries of river Sutlej and Beas.
3. Culture systems
 - a) Conventional
 - b) Extensive



- c) Intensive
- d) Monoculture
- e) Poly culture

4. Integrated fish farming

Duck-cum-poultry-cum-pig-dairy fish farming.

Section: B

5. Sewage fed fisheries

6. Cold water fisheries

- a) Mahseer fisheries
- b) Trout fisheries

7. Fish Diseases and their control

- a) Viral
- b) Bacterial
- c) Fungal
- d) Helminth
- e) Crustacean
- f) Diseases due to unhygienic conditions
- g) Diseases during transportation.

8. Fish by-product

9. Marketing of fish

- a) Fresh fish
- b) Preservation of fish.

Practical Based on Theory paper

ZOO 307 & 308

1. Morphology of a carp, cat fish and perch.

2. Morphometric and meristic characters of a typical fish.

3. Identification of the following fishes using key:

Notopterus spp. : *Laboe rohita*, *L. colbasu*, *L. bata*, *Cirrhinus mrigala*, *Catla catla*, *Puntius sarana*, *Tor putitora*, *Schizothorex*, *Asperata seenghala*, *Wallago attu*, *Callichrous pabda*, *Bagarius bagarius*, *Heteropneustes fossilis*, *Channa marulius*, *C. striatus*, *Xenentodon cancula*, *Cyprinus carpio*, *Hypophthalmichthyes molitrix*, *Ctenopharyngodon idella*, *Colisa fasciatus*, *Mastacembelus armatus*. For the identification of the fishes, the students can use already prepared keys or can prepare their own keys.

4. Determination of food and feeding habits of locally available fishes on the basis of stomach analysis adopting the following methods.
 - a. Frequency occurrence method
 - b. Feeding intensity
 - c. Point method
5. Determination of maturity stages (both male and female) of any commercial fish (preserved specimens).
6. Preparation of permanent slides of Phytoplankton and Zooplanktons which constitute the food of commercial fishes, their identification and study of important characters.
7. Identification of aquatic weeds of a fish pond.
8. Estimation of following chemical parameters of the water of a fish pond:
 - a. Temperature
 - b. pH
 - c. Dissolved oxygen
 - d. Free CO₂
 - e. Phosphate
 - f. Total Dissolved solids
 - g. Nitrates
 - h. Hardness
 - i. Chloride
9. Examination of diseased fishes.
10. Visits of a fish farm and fish market.

SUGGESTED READINGS

1. Fish and Fisheries of India: V.G. Jhingran Hindustan Publishing Corporation of India, Delhi, 1991.
2. Fish of India: F-day. Reprinted Edition Vol. I & II Jagminder Book Agency, New Delhi, 1994.
3. Monnography on the Fishes: M.S. Johal & K.K. Tandon, Pb. of Reorganised Punjab Fish of Bull, Vols. I & II 1979, 1980.
4. Fishery Development: S.C. Agarwal & M.S. Johal, Narendra Publishing House, Delhi, 1997.
5. Fishes of Punjab: M.S. Johal & K.K. Tandon, Res. Bull., Panjab University, Vol. 32, pp. 143 – 154, 1981.
6. Freshwater Fishery Biology: Karl F. Legler Wm. C-Brown Company Publ., Dubuque, IOWA, USA, 1969.

7. Fisheries Techniques : Brain R. Murphy & David W. Willis (Ed.) American Fisheries Society Bethesda Maryland, USA, 1996.

Guidelines for the conduct of Practical Examination

Max Marks: 40

Pass Marks: 35%

Time Allowed: 3 hours

Option I (303 & 304)

1. To identify the specimens A, B & C. Write the disease caused/spread by each and two reasons for their identification. 9
2. To find out the blood groups, erythrocyte sedimentation rate/bleeding time/coagulation time/prothrombin time of the given sample and write the procedure adopted. 6
3. To find out the RBC count/ TLC/DLC of the given sample and write the procedure adopted 6
4. To identify the slides/photographs D, E and write diagnostic features. 5
5. Practical Note-book 6
6. Viva- voce 5
7. Project Work 5

Option II (ZOO 305 & 306)

1. To identify the type of mouth parts of given specimen. Make a labeled sketch of the same. 4
2. To identify specimens A, B & C belonging to crop pests, stored grain pests and insects of medical importance respectively. Give two identification characters of each. Mention their scientific names and economic importance also. 9
3. To identify the type of antennae, leg, wing, larva/pupa. Write a note on its external morphology 4
4. Note on life history/castes of the given insect 4
5. Description of head sclerites/ insect wing venation 5
6. Insect collection. 6
7. Practical Note-book 4
8. Viva-voce 4

Option III (ZOO 307 & 308)

1. To identify the given sample A and write the morphometric and meristic characters. Make labeled sketch of given samples. 6
2. Identify and write morpho-ecological note on specimens B and C. 8
3. To identify slides D and E. write two identifying characters of each 6
4. Estimation of chemical parameters of water from a fish pond. 5
5. Practical Note-book 5
6. Viva-voce 5
7. Project Work Report 5

Head

Department of Zoology

Environmental Sciences

Patna, Bihar - 801313-147002

ਬੀ.ਏ. ਭਾਗ ਤੀਜਾ (ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ)

2022-23, 2023-24, 2024-25 ਸੈਸ਼ਨਾਂ ਦੇ ਰੈਗੂਲਰ ਵਿਦਿਆਰਥੀਆਂ ਲਈ
(ਸਮੈਸਟਰ ਪੰਜਵਾਂ)

ਕੁਲ ਅੰਕ : 100

ਬਾਹਰੀ ਪਰੀਖਿਆ: 75 ਅੰਕ

ਬਾਹਰੀ ਪਰੀਖਿਆ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 26

ਸਮਾਂ : 3 ਘੰਟੇ

ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 35

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ : 25 ਅੰਕ

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 09

ਅਧਿਆਪਨ: 50 ਪੀਰੀਅਡ

ਸਿਲੇਬਸ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

ਭਾਗ - ਓ

1. ਵਾਰਤਕ ਵੰਨਗੀਆਂ ਦੇ ਸਰੂਪ, ਸਿਧਾਂਤ ਅਤੇ ਪ੍ਰਕਾਰਜ :

i) ਮੱਧਕਾਲ ਦੀਆਂ ਵਾਰਤਕ ਵੰਨਗੀਆਂ : ਜਨਮ ਸਾਖੀ, ਸਾਖੀ, ਪਰਚੀ, ਗੋਸ਼ਟਿ, ਹੁਕਮਨਾਮਾ ਆਦਿ।

ii) ਆਧੁਨਿਕ ਕਾਲ ਦੀਆਂ ਵਾਰਤਕ ਵੰਨਗੀਆਂ : ਨਿਬੰਧ, ਜੀਵਨੀ, ਸਵੈਜੀਵਨੀ, ਰੇਖਾ-ਚਿੱਤਰ, ਖ਼ਤ, ਡਾਇਰੀ ਆਦਿ।

10 ਅੰਕ

2. ਵਾਰਤਕੀ (ਸੰਪਾ. ਅਮਰਜੀਤ ਸਿੰਘ ਕਾਂਗ ਤੇ ਤੇਜਵੰਤ ਸਿੰਘ ਮਾਨ), ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ। 10 ਅੰਕ

ਭਾਗ - ਅ

3. ਕਹਾਣੀ, ਕਵਿਤਾ, ਇਕਾਂਗੀ ਜਾਂ ਨਿਬੰਧ ਰਚਨਾ ਨਾਲ ਸੰਬੰਧਤ ਸਿਰਜਣਾਤਮਕ ਲੇਖਣ। 10 ਅੰਕ

4. ਵਿਆਕਰਣ

i) ਸ਼ਬਦ ਬਣਤਰ ਤੇ ਸ਼ਬਦ ਰਚਨਾ : ਪਰਿਭਾਸ਼ਾ, ਮੁੱਢਲੇ ਸੰਕਲਪ

(ਮੂਲ ਰੂਪ ਜਾਂ ਧਾਤੂ, ਅਗੇਤਰ, ਪਿਛੇਤਰ, ਵਿਉਂਤਪਤ ਤੇ ਰੂਪਾਂਤਰਣੀ ਰੂਪ)

5 ਅੰਕ

ii) ਵਾਕੰਸ਼: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵੰਨਗੀਆਂ

ਓ) ਨਾਂਵ ਵਾਕੰਸ਼: ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਤੇ ਪ੍ਰਕਾਰਜ

ਅ) ਕਿਰਿਆ ਵਾਕੰਸ਼: ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਤੇ ਪ੍ਰਕਾਰਜ

5 ਅੰਕ

iii) ਕਾਰਕ ਅਤੇ ਕਾਰਕੀ ਸੰਬੰਧ

5 ਅੰਕ

(5+5+5=15 ਅੰਕ)

ਭਾਗ - ਏ

5. ਵਾਰਤਕ ਸਿਧਾਂਤ, ਪਾਠ ਪੁਸਤਕ 'ਵਾਰਤਕੀ' ਅਤੇ ਵਿਆਕਰਨ ਉੱਤੇ ਅਧਾਰਤ ਸੰਖੇਪ ਉੱਤਰਾਂ ਵਾਲੇ 15 ਪ੍ਰਸ਼ਨ।

15X2=30 ਅੰਕ

ਪ੍ਰੀਖਿਆਰਥੀਆਂ, ਅਧਿਆਪਕਾਂ ਅਤੇ ਪੇਪਰ ਸੈਟਰ ਲਈ ਬਾਹਰੀ ਮੁਲਾਂਕਣ ਵਾਸਤੇ ਹਦਾਇਤਾਂ

ਭਾਗ - ਓ

1. ਮੱਧਕਾਲੀ ਅਤੇ ਆਧੁਨਿਕ ਕਾਲ ਨਾਲ ਸੰਬੰਧਤ ਵਾਰਤਕ ਵੰਨਗੀਆਂ ਦੇ ਸਰੂਪ, ਸਿਧਾਂਤ ਤੇ ਪ੍ਰਕਾਰਜ ਬਾਰੇ ਅਧਿਐਨ/ ਅਧਿਆਪਨ ਇਸ ਤਰ੍ਹਾਂ ਕੀਤਾ ਜਾਵੇ ਕਿ ਇਨ੍ਹਾਂ ਵੰਨਗੀਆਂ ਦਾ ਆਪਸੀ ਅੰਤਰ ਪੂਰੀ ਤਰ੍ਹਾਂ ਨਾਲ ਸਪੱਸ਼ਟ ਹੋ ਜਾਵੇ। ਇਸ ਭਾਗ ਵਿੱਚ ਕੋਈ ਤਿੰਨ ਵੰਨਗੀਆਂ ਵਿੱਚੋਂ ਕਿਸੇ ਇੱਕ ਦਾ ਉੱਤਰ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇਗਾ ਜਾਂ ਕੋਈ ਦੋ ਵੰਨਗੀਆਂ ਦੇ ਕੇ ਉਨ੍ਹਾਂ ਵਿਚਲੇ ਅੰਤਰ ਨੂੰ ਸਪੱਸ਼ਟ ਕਰਨ ਸੰਬੰਧੀ ਸਵਾਲ ਪੁੱਛਿਆ ਜਾਵੇਗਾ। (ਤਿੰਨ ਵਿੱਚੋਂ ਇੱਕ) **10 ਅੰਕ**
2. "ਵਾਰਤਕੀ" ਪਾਠ-ਪੁਸਤਕ ਉੱਤੇ ਆਧਾਰਿਤ ਵਾਰਤਕ ਰਚਨਾਵਾਂ ਦੇ ਵਿਸ਼ੇ ਵਸਤੂ, ਮੂਲ ਭਾਵ ਅਤੇ ਜੀਵਨ ਦੀ ਸਮਝ ਵਿਚ ਮਹੱਤਵ ਤੇ ਸਾਰਥਕਤਾ ਬਾਰੇ ਪ੍ਰੀਖਿਆਰਥੀਆਂ ਨੂੰ ਪਾਠਕ ਦੇ ਰੂਪ ਵਿਚ ਹੁੰਗਾਰਾ ਦੇਣਾ ਹੋਵੇਗਾ। (ਤਿੰਨ ਵਿੱਚੋਂ ਇੱਕ) **10 ਅੰਕ**

ਭਾਗ - ਅ

3. ਸਿਰਜਣਾਤਮਕ ਲੇਖਣ: ਵਿਦਿਆਰਥੀਆਂ ਵਿੱਚ ਸਿਰਜਣਾਤਮਕ ਲੇਖਣ ਦਾ ਹੁਨਰ ਪੈਦਾ ਕਰਨ ਲਈ ਕਵਿਤਾ, ਕਹਾਣੀ, ਇਕਾਂਗੀ ਜਾਂ ਲੇਖ/ ਨਿਬੰਧ ਰਚਨਾ ਨਾਲ ਸੰਬੰਧਤ ਕੋਈ ਪੰਜ ਸ਼ਬਦ/ ਵਾਕਾਂਸ਼ ਦੇ ਕੇ ਉਨ੍ਹਾਂ ਦੇ ਆਧਾਰ 'ਤੇ ਆਪਣੀ ਖੁਦ ਦੀ ਕਹਾਣੀ, ਕਵਿਤਾ, ਇਕਾਂਗੀ ਜਾਂ ਨਿਬੰਧ ਰਚਨਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇਗਾ। **10 ਅੰਕ**
4. ਵਿਆਕਰਣ : ਇਸ ਵਿਚ ਵਿਆਕਰਣ ਦੇ ਸੰਕਲਪਾਂ ਦੀ ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਤੇ ਪ੍ਰਕਾਰਜ ਬਾਰੇ ਤਿੰਨੇ ਉਪਭਾਗਾਂ ਵਿੱਚੋਂ 2 - 2 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਵਿਦਿਆਰਥੀ ਨੂੰ ਹਰ ਇੱਕ ਉਪਭਾਗ ਵਿੱਚੋਂ 1-1 ਪ੍ਰਸ਼ਨ ਦਾ ਸੰਖੇਪ ਉੱਤਰ ਉਦਾਹਰਣ ਸਹਿਤ ਸਪੱਸ਼ਟ ਕਰਨ ਲਈ ਕਿਹਾ ਜਾਵੇਗਾ। (ਛੇ ਵਿੱਚੋਂ ਤਿੰਨ) **5+5+5= 15 ਅੰਕ**

ਭਾਗ - ਏ

5. ਭਾਗ (ਓ) ਦੇ ਵਾਰਤਕ ਸਿਧਾਂਤ ਅਤੇ ਪਾਠ ਪੁਸਤਕ 'ਵਾਰਤਕੀ' ਵਾਲੇ ਭਾਗ ਵਿੱਚੋਂ 8 ਛੋਟੇ ਪ੍ਰਸ਼ਨ ਅਤੇ ਭਾਗ (ਅ) ਦੇ ਵਿਆਕਰਨ ਵਾਲੇ ਭਾਗ ਵਿੱਚੋਂ 7 ਪ੍ਰਸ਼ਨ (ਕੁਲ 15) ਸੰਖੇਪ ਉਤਰਾਂ ਵਾਲੇ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਪ੍ਰੀਖਿਆਰਥੀਆਂ ਨੂੰ ਸਾਰੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਸੰਖੇਪ ਉਤਰ (4-6 ਸਤਰਾਂ ਵਿਚ) ਦੇਣੇ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ ਅੰਕ ਦਾ ਹੋਵੇਗਾ। **15x2=30 ਅੰਕ**

ਪ੍ਰੀਖਿਆਰਥੀਆਂ, ਅਧਿਆਪਕਾਂ ਅਤੇ ਪੇਪਰ ਸੈਟਰ ਲਈ ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਵਾਸਤੇ ਹਦਾਇਤਾਂ

ਅਸਾਈਨਮੈਂਟ ਲਈ ਹਦਾਇਤਾਂ : ਭਾਗ (ਅ) ਦੇ ਕਵਿਤਾ, ਕਹਾਣੀ, ਇਕਾਂਗੀ ਜਾਂ ਲੇਖ/ ਨਿਬੰਧ ਰਚਨਾ ਨਾਲ ਸੰਬੰਧਤ ਵੰਨਗੀਆਂ ਬਾਰੇ ਵਿਦਿਆਰਥੀ ਘੱਟ ਤੋਂ ਘੱਟ 20 ਪੰਨਿਆਂ ਦੀ ਇੱਕ ਸਿਰਜਣਾਤਮਕ ਲੇਖਣ ਦੀ ਡਾਇਰੀ/ਸਕਰੈਪ ਬੁੱਕ ਤਿਆਰ ਕਰੇਗਾ, ਜਿਸ ਵਿਚ ਹਰ ਵੰਨਗੀ (ਕਹਾਣੀ, ਕਵਿਤਾ, ਇਕਾਂਗੀ ਤੇ ਨਿਬੰਧ) ਦੀਆਂ ਘੱਟ ਤੋਂ ਘੱਟ ਦੋ ਰਚਨਾਵਾਂ ਜ਼ਰੂਰ ਸ਼ਾਮਲ ਕਰੇਗਾ। ਵਿਦਿਆਰਥੀ ਨੂੰ ਜਿਸ ਵੰਨਗੀ ਵਿਚ ਵਧੇਰੇ ਮੁਹਾਰਤ ਮਹਿਸੂਸ ਹੋਵੇਗੀ, ਉਸ ਵੰਨਗੀ ਦੀਆਂ ਦੋ ਤੋਂ ਵੱਧ ਰਚਨਾਵਾਂ ਵੀ ਸ਼ਾਮਲ ਕੀਤੀਆਂ ਜਾ ਸਕਦੀਆਂ ਹਨ। ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਤਹਿਤ ਅਸਾਈਨਮੈਂਟ ਦੇ ਅੰਕ ਇਸ ਡਾਇਰੀ/ਸਕਰੈਪ ਬੁੱਕ ਦੇ ਆਧਾਰ 'ਤੇ ਦਿੱਤੇ ਜਾਣਗੇ।

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3. ਪੁਆਰ, ਜੇਗਿੰਦਰ ਸਿੰਘ ਅਤੇ ਹੋਰ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦਾ ਵਿਆਕਰਨ, ਭਾਗ-III, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਕਾਦਮੀ, ਜਲੰਧਰ, 1994
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11. ਡਾ. ਪਰਮਿੰਦਰ ਸਿੰਘ, ਸਾਹਿਤ ਦੇ ਰੂਪ, ਲਹੌਰ ਬੁੱਕ ਸ਼ਾਪ, ਲੁਧਿਆਣਾ।



ਬੀ.ਏ. ਭਾਗ ਤੀਜਾ (ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ)

2022-23, 2023-24, 2024-25 ਸੈਸ਼ਨਾਂ ਦੇ ਰੈਗੂਲਰ ਵਿਦਿਆਰਥੀਆਂ ਲਈ
(ਸਮੇਸਟਰ ਛੇਵਾਂ)

ਕੁਲ ਅੰਕ : 100

ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 35

ਬਾਹਰੀ ਪਰੀਖਿਆ: 75 ਅੰਕ

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ : 25 ਅੰਕ

ਬਾਹਰੀ ਪਰੀਖਿਆ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 26

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 09

ਸਮਾਂ : 3 ਘੰਟੇ

ਅਧਿਆਪਨ: 50 ਪੀਰੀਅਡ

ਸਿਲੇਬਸ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

ਭਾਗ - ਓ

1. ਲੋਕਧਾਰਾ ਦੀ ਭੂਮਿਕਾ, ਸੰਪਾਦਕ: ਡਾ. ਭੁਪਿੰਦਰ ਸਿੰਘ ਖਹਿਰਾ ਅਤੇ ਡਾ. ਸੁਰਜੀਤ ਸਿੰਘ 8 + 8 = 16 ਅੰਕ

ਭਾਗ - ਅ

2. ਅਨੁਵਾਦ ਸਿਧਾਂਤ, ਪ੍ਰਕਾਰਜ ਅਤੇ ਵੰਨਗੀਆਂ

ੳ) ਅਨੁਵਾਦ ਸਿਧਾਂਤ: ਅਨੁਵਾਦ ਕੀ ਹੈ, ਅਨੁਵਾਦ ਦਾ ਮਹੱਤਵ ਤੇ ਪ੍ਰਕਾਰਜ

ਅ) ਅਨੁਵਾਦ ਦੀਆਂ ਵੰਨਗੀਆਂ: ਸਾਹਿਤਕ, ਪ੍ਰਸ਼ਾਸਕੀ, ਕਿੱਤਾਮੁਖੀ ਤੇ ਤਕਨੀਕੀ ਅਨੁਵਾਦ 10 ਅੰਕ

ੲ) ਅਨੁਵਾਦ ਦਾ ਵਿਹਾਰਕ ਅਭਿਆਸ: ਸਾਹਿਤਕ ਰਚਨਾ (ਅੰਗਰੇਜ਼ੀ ਜਾਂ ਹਿੰਦੀ) ਦੇ ਇੱਕ ਪੈਰੇ/ਬੰਦ/ਖੰਡ ਜਾਂ ਇੱਕ ਨਿੱਕੀ ਕਵਿਤਾ ਦਾ ਪੰਜਾਬੀ ਅਨੁਵਾਦ 5 ਅੰਕ

3. ਵਿਆਕਰਣ

(i) ਉਪਵਾਕ: ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ, ਪ੍ਰਕਾਰਜ ਅਤੇ ਕਿਸਮਾਂ

(ii) ਵਾਕ: ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ, ਪ੍ਰਕਾਰਜ ਅਤੇ ਕਿਸਮਾਂ

(iii) ਵਾਕਾਤਮਕ ਜੁਗਤਾਂ (ਮੇਲ ਅਤੇ ਅਧਿਕਾਰ)

(iv) ਵਿਹਾਰਕ ਵਿਆਕਰਨਕ ਵਿਸ਼ਲੇਸ਼ਣ 10 + 4 = 14 ਅੰਕ

ਭਾਗ - ਏ

4. ਸਮੁੱਚੇ ਪਾਠਕ੍ਰਮ ਵਿੱਚੋਂ ਸੰਖੇਪ ਉਤਰਾਂ ਵਾਲੇ ਪ੍ਰਸ਼ਨ।

15 x 2 = 30 ਅੰਕ

ਪ੍ਰੀਖਿਆਰਥੀਆਂ, ਅਧਿਆਪਕਾਂ ਅਤੇ ਪੇਪਰ ਸੈਟਰ ਲਈ ਬਾਹਰੀ ਮੁਲਾਂਕਣ ਵਾਸਤੇ ਹਦਾਇਤਾਂ

ਭਾਗ - ਓ

1. ਓ) ਪਾਠ-ਪੁਸਤਕ "ਲੋਕਧਾਰਾ ਦੀ ਭੂਮਿਕਾ" ਵਿਚੋਂ ਕੋਈ ਦੋ ਲੇਖ ਦੇ ਕੇ ਉਨ੍ਹਾਂ ਵਿੱਚੋਂ ਕਿਸੇ ਇੱਕ ਦਾ ਵਿਸ਼ਾ ਵਸਤੂ/ਸਾਰ ਲਿਖਣ ਲਈ ਆਖਿਆ ਜਾਵੇਗਾ। (ਦੋ ਵਿੱਚੋਂ ਇੱਕ) 8 ਅੰਕ
- ਅ) ਪਾਠ-ਪੁਸਤਕ "ਲੋਕਧਾਰਾ ਦੀ ਭੂਮਿਕਾ" ਵਿਚੋਂ ਚਾਰ ਸੰਖੇਪ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿੱਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਦੋ ਦਾ ਉੱਤਰ ਦੇਣਾ ਹੋਵੇਗਾ। ਪ੍ਰਸ਼ਨ ਇਸ ਤਰ੍ਹਾਂ ਪੁੱਛੇ ਜਾਣ ਕਿ ਹਰ ਪ੍ਰਸ਼ਨ ਦਾ ਉੱਤਰ 8-10 ਸਤਰਾਂ ਵਿਚ ਦਿੱਤਾ ਜਾ ਸਕਦਾ ਹੋਵੇ। (ਚਾਰ ਵਿੱਚੋਂ ਦੋ) 4x2=8 ਅੰਕ

ਭਾਗ - ਘ

2. ਓ) ਅਨੁਵਾਦ ਸਿਧਾਂਤ, ਪ੍ਰਕਾਰਜ ਅਤੇ ਵੰਨਗੀਆਂ ਬਾਰੇ ਕੋਈ ਦੋ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛ ਕੇ ਉਨ੍ਹਾਂ ਵਿਚੋਂ ਕਿਸੇ ਇੱਕ ਦਾ ਉੱਤਰ ਦੇਣ ਲਈ ਆਖਿਆ ਜਾਵੇਗਾ। (ਦੋ ਵਿੱਚੋਂ ਇੱਕ) 10 ਅੰਕ
- ਅ) ਅਨੁਵਾਦ ਦੇ ਵਿਹਾਰਕ ਅਭਿਆਸ ਲਈ ਸਾਹਿਤਕ ਰਚਨਾ (ਅੰਗਰੇਜ਼ੀ ਜਾਂ ਹਿੰਦੀ) ਦੇ ਇੱਕ ਪੈਰੇ/ਬੰਦ/ਖੰਡ ਜਾਂ ਇੱਕ ਨਿੱਕੀ ਕਵਿਤਾ ਦਾ ਪੰਜਾਬੀ ਅਨੁਵਾਦ ਕਰਨ ਲਈ ਆਖਿਆ ਜਾਵੇਗਾ। 05 ਅੰਕ
3. ਓ) ਵਿਆਕਰਣ ਦੇ ਨਿਰਧਾਰਤ ਭਾਗ (i, ii, iii) ਵਿਚੋਂ ਦੋ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛ ਕੇ ਉਨ੍ਹਾਂ ਵਿਚੋਂ ਕਿਸੇ ਇੱਕ ਦਾ ਉੱਤਰ ਦੇਣ ਲਈ ਆਖਿਆ ਜਾਵੇਗਾ। 10 ਅੰਕ
- ਅ) ਵਿਆਕਰਣ ਦੇ ਨਿਰਧਾਰਤ ਭਾਗ (iv) ਵਿਚ ਪਾਠ-ਪੁਸਤਕ "ਲੋਕਧਾਰਾ ਦੀ ਭੂਮਿਕਾ" ਵਿਚੋਂ ਤਿੰਨ ਵਾਕ ਦੇ ਕੇ ਉਨ੍ਹਾਂ ਦੀ ਭਾਸ਼ਾ ਦਾ ਵਿਵਹਾਰਕ ਵਿਆਕਰਨਕ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰਨ ਲਈ ਕਿਹਾ ਜਾਵੇਗਾ। 2x2 = 04 ਅੰਕ

ਭਾਗ - ਏ

4. ਇਸ ਭਾਗ ਵਿਚ ਸੰਖੇਪ ਉਤਰਾਂ ਵਾਲੇ ਕੁੱਲ 15 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਪਾਠ-ਪੁਸਤਕ "ਲੋਕਧਾਰਾ ਦੀ ਭੂਮਿਕਾ" ਵਿਚੋਂ 7 ਪ੍ਰਸ਼ਨ ਅਤੇ ਵਿਆਕਰਣ ਵਾਲੇ ਭਾਗ ਵਿਚੋਂ 8 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਪ੍ਰੀਖਿਆਰਥੀ ਨੇ ਸਾਰੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ ਦੇਣੇ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 2 ਅੰਕ ਹੋਣਗੇ। 15x2=30 ਅੰਕ

ਪ੍ਰੀਖਿਆਰਥੀਆਂ, ਅਧਿਆਪਕਾਂ ਅਤੇ ਪੇਪਰ ਸੈਟਰ ਲਈ ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਵਾਸਤੇ ਹਦਾਇਤਾਂ

ਇਸ ਭਾਗ ਲਈ ਵਿਦਿਆਰਥੀ 20-30 ਪੰਨਿਆਂ ਦੀ ਸਕਰੈਪਬੁੱਕ ਤਿਆਰ ਕਰੇਗਾ, ਜਿਸ ਵਿਚ ਹਰ ਕਿਸਮ ਦੇ ਅਨੁਵਾਦ (ਹਿੰਦੀ ਅਤੇ ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ) ਦੇ ਘੱਟ ਤੋਂ ਘੱਟ ਦੋ ਪੰਨੇ ਜ਼ਰੂਰ ਹੋਣਗੇ। ਬਾਕੀ ਦੇ ਪੰਨੇ ਉਸ ਨੂੰ ਪਸੰਦ ਅਨੁਵਾਦ ਵੰਨਗੀ ਦੇ ਹੋ ਸਕਦੇ ਹਨ। ਸਾਹਿਤਕ ਰਚਨਾਵਾਂ ਅਨੁਵਾਦ ਕਰਨ ਵਿਚ ਦਿਲਚਸਪੀ ਰੱਖਣ ਵਾਲਾ ਵਿਦਿਆਰਥੀ 20-30 ਪੰਨਿਆਂ ਦੀ ਕੋਈ ਇੱਕ ਰਚਨਾ ਦਾ ਅਨੁਵਾਦ ਵੀ ਕਰ ਸਕਦਾ ਹੈ। ਇਹ ਕਾਰਜ ਅਧਿਆਪਕ ਦੀ ਨਿਗਰਾਨੀ ਵਿਚ ਕੀਤਾ ਜਾਵੇਗਾ ਅਤੇ ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਵਿਚ ਅਸਾਈਨਮੈਂਟ ਦੇ ਅੰਕ ਇਸ ਸਕਰੈਪ ਬੁੱਕ ਜਾਂ ਅਨੁਵਾਦਿਤ ਰਚਨਾ ਦੇ ਆਧਾਰ 'ਤੇ ਦਿੱਤੇ ਜਾਣਗੇ।

ਸਹਾਇਕ ਪਾਠ-ਸਾਮੱਗਰੀ

1. ਦੁਨੀ ਚੰਦਰ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦਾ ਵਿਆਕਰਨ, ਪੰਜਾਬ ਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ੍ਹ, 1964
2. ਡਾ. ਹਰਕੀਰਤ ਸਿੰਘ, ਰੂਪਾਂਤਰੀ ਵਿਆਕਰਣ, ਪੰਜਾਬ ਸਟੇਟ ਯੂਨੀਵਰਸਿਟੀ ਟੈਕਸਟ ਬੁੱਕ ਬੋਰਡ ਚੰਡੀਗੜ੍ਹ।
3. ਪੁਆਰ, ਜੋਗਿੰਦਰ ਸਿੰਘ ਅਤੇ ਹੋਰ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦਾ ਵਿਆਕਰਨ ਭਾਗ-III, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਕਾਦਮੀ, ਜਲੰਧਰ, 1994
4. ਡਾ. ਹਰਕੀਰਤ ਸਿੰਘ ਤੇ ਗਿਆਨੀ ਲਾਲ ਸਿੰਘ, ਕਾਲਿਜ ਪੰਜਾਬੀ ਵਿਆਕਰਣ ਤੇ ਲੇਖ-ਮਾਲਾ, ਪੰਜਾਬ ਸਟੇਟ ਯੂਨੀਵਰਸਿਟੀ ਟੈਕਸਟ ਬੁੱਕ ਬੋਰਡ, ਚੰਡੀਗੜ੍ਹ।
5. ਡਾ. ਬਲਦੇਵ ਸਿੰਘ ਚੀਮਾ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਵਿਗਿਆਨ: ਤਕਨੀਕੀ ਸ਼ਬਦਾਵਲੀ ਦਾ ਕੋਸ਼, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ ਪਟਿਆਲਾ।
6. ਸੁਸ਼ੀਲ ਕੁਮਾਰ, ਅਨੁਵਾਦ ਦਾ ਸੰਵਾਦ, ਉਡਾਣ ਪ੍ਰਕਾਸ਼ਨ, ਮਾਨਸਾ, 2003
7. ਜਸਪਾਲ ਕੌਰ, ਅਨੁਵਾਦ ਅਤੇ ਮੌਖਿਕ ਅਨੁਵਾਦ ਕਲਾ, ਮਨਪ੍ਰੀਤ ਪ੍ਰਕਾਸ਼ਨ, ਦਿੱਲੀ, 2014



Under Graduate Level(For All Courses)(Combined Syllabus)

Punjabi Compulsory - Mudhala Gyan)

PART-III (SEMESTER-V&VI)

2019-20, 2020-21 ਅਤੇ 2021-22 ਸੈਸ਼ਨ ਲਈ

2022-23, 2023-24 ਅਤੇ 2024-25 ਸੈਸ਼ਨ ਲਈ

ਸਮੈਸਟਰ ਪੰਜਵਾਂ

ਕੁਲ ਅੰਕ : 100

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ : 25 ਅੰਕ

ਬਾਹਰੀ ਪਰੀਖਿਆ: 75ਅੰਕ

ਸਮਾਂ : 3 ਘੰਟੇ

ਵਿਸ਼ੇ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 35

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 09

ਬਾਹਰੀ ਪਰੀਖਿਆ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 26

(ਅਧਿਆਪਨ: 50 ਪੀਰੀਅਡ)

ਸਿਲੇਬਸ ਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਭਾਗ -ੳ

ਪੰਜਾਬੀ ਮੁੱਢਲਾਗਿਆਨ ਭਾਗ-III, ਸੰਪਾ. ਪ੍ਰੋ. ਲਖਵੀਰ ਸਿੰਘ, ਡਾ. ਸੁਰਜੀਤ ਸਿੰਘ, ਪ੍ਰੋ. ਬਲਬੀਰ ਸਿੰਘ

ਪਬਲੀਕੇਸ਼ਨ ਬਿਓਰੇ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।

ਪੰਜਾਬੀ ਮੁੱਢਲਾਗਿਆਨ ਭਾਗ-III ਦੇ ਇੱਕ ਤੋਂ ਪੰਜ ਤੱਕ ਲੇਖ।

ਭਾਗ -ਅ

I. ਲੇਖ (400 ਸ਼ਬਦ) ਵਾਤਾਵਰਣ, ਸਮਾਜਕ ਜਾਂ ਸਭਿਆਚਾਰਕ ਵਿਸ਼ੇ ਨਾਲ ਸਬੰਧਤ।

II. ਮੁਹਾਵਰੇ (ਉਪਰੋਕਤ ਪਾਠ ਪੁਸਤਕ ਵਿਚ ਦਰਜ)

ਭਾਗ -ੲ

ਉਪਰੋਕਤ ਪਾਠ ਪੁਸਤਕ ਵਿੱਚੋਂ ਸੰਖੇਪ ਉੱਤਰਾਂ ਵਾਲੇ ਪ੍ਰਸ਼ਨ।

15x2=30

ਅੰਕ

ਅੰਕ ਵੰਡ ਅਤੇ ਪੇਪਰ ਸੈੱਟਰ ਲਈ ਹਦਾਇਤਾਂ

1. ਸਾਰੇ ਸਿਲੇਬਸ ਵਿੱਚੋਂ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

2. ਪਾਠ ਪੁਸਤਕ ਵਿੱਚੋਂ ਕਿਸੇ ਲੇਖ ਦਾ ਵਿਸ਼ਾ/ਸੰਖੇਪ ਸਾਰ ਜਾਂ ਲੇਖ ਵਿੱਚੋਂ ਕੋਈ ਹੋਰ ਸਰਲ ਪ੍ਰਸ਼ਨ

(ਪੰਜ ਵਿੱਚੋਂ ਦੋ) 2x8=16

ਅੰਕ

3. ਲੇਖ (ਵਾਤਾਵਰਣ, ਸਮਾਜਕ ਜਾਂ ਸਭਿਆਚਾਰਕ ਵਿਸ਼ੇ ਤੇ)

(ਤਿੰਨ ਵਿੱਚੋਂ ਇੱਕ) 09

ਅੰਕ

4. ਪੰਜਾਬੀ ਮੁਢਲਾ ਗਿਆਨ ਪੁਸਤਕ ਵਿੱਚੋਂ 15 ਮੁਹਾਵਰੇ ਦੇ ਕੇ 10 ਦੇ ਅਰਥ ਦੱਸ ਕੇ ਵਾਕਾਂ ਵਿੱਚ ਵਰਤਣ ਲਈ ਕਿਹਾ ਜਾਵੇਗਾ $10 \times 2 = 20$

ਅੰਕ

5. ਪਾਠ ਪੁਸਤਕ ਤੇ ਆਧਾਰ ਸੰਖੇਪ ਉੱਤਰਾਂ ਵਾਲੇ 15 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਵਿਦਿਆਰਥੀ ਨੇ ਸਾਰੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ ਦੇਣੇ ਹੋਣਗੇ। ਹਰੇਕ

ਪ੍ਰਸ਼ਨ

ਦੇ 2 ਅੰਕ ਹੋਣਗੇ।

$15 \times 2 = 30$ ਅੰਕ

ਬੀ.ਏ/ਬੀ.ਐਸ.ਸੀ/ਬੀ.ਕਾਮ. ਭਾਗ ਤੀਜਾ ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਮੁੱਢਲਾ ਗਿਆਨ) (ਸਮੇਸਟਰ)

2016-17, 2017-18 ਅਤੇ 2018-19 ਸੈਸ਼ਨ ਲਈ

ਸਮੇਸਟਰ ਛੇਵਾਂ

ਕੁਲ ਅੰਕ : 100

ਵਿਸ਼ੇ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 35

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ : 25 ਅੰਕ

ਅੰਦਰੂਨੀ ਮੁਲਾਂਕਣ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 09

ਬਾਹਰੀ ਪਰੀਖਿਆ: 75 ਅੰਕ

ਬਾਹਰੀ ਪਰੀਖਿਆ ਵਿੱਚੋਂ ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ : 26

ਸਮਾਂ : 3 ਘੰਟੇ

(ਅਧਿਆਪਨ: 50 ਪੀਰੀਅਡ)

ਸਿਲੇਬਸ ਤੇ ਪਾਠ ਪੁਸਤਕਾਂ

ਭਾਗ -ੳ

ਪੰਜਾਬੀ ਮੁੱਢਲਾ ਗਿਆਨ ਭਾਗ-III, ਸੰਪਾ. ਪ੍ਰੋ. ਲਖਵੀਰ ਸਿੰਘ, ਡਾ. ਸੁਰਜੀਤ ਸਿੰਘ, ਪ੍ਰੋ. ਬਲਬੀਰ ਸਿੰਘ

ਪਬਲੀਕੇਸ਼ਨ ਬਿਓਰੇ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।

ਪੰਜਾਬੀ ਮੁੱਢਲਾ ਗਿਆਨ ਭਾਗ-III ਦੇ ਛੇ ਤੋਂ ਦਸ ਤੱਕ ਲੇਖ।

ਭਾਗ -ਅ

I ਚਿੱਠੀ-ਪੱਤਰ (ਨਿੱਜੀ ਜਾਂ ਕਾਰੋਬਾਰੀ)।

II ਬਹੁਤੇ ਸ਼ਬਦਾਂ ਦੀ ਥਾਂ ਇੱਕ ਸ਼ਬਦ। (ਉਪਰੋਕਤ ਪਾਠ ਪੁਸਤਕ ਵਿੱਚੋਂ)

ਭਾਗ -ੲ

ਉਪਰੋਕਤ ਪਾਠ ਪੁਸਤਕ ਵਿਚੋਂ ਸੰਖੇਪ ਉੱਤਰਾਂ ਵਾਲੇ ਪ੍ਰਸ਼ਨ।

ਅੰਕ ਵੰਡ ਅਤੇ ਪੇਪਰ ਸੈਂਟਰ/ ਪ੍ਰੀਖਿਆਰਥੀ ਲਈ ਹਦਾਇਤਾਂ

1. ਸਾਰੇ ਸਿਲੇਬਸ ਵਿੱਚੋਂ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

2. ਪਾਠ ਪੁਸਤਕ ਵਿੱਚੋਂ ਕਿਸੇ ਲੇਖ ਦਾ ਵਿਸ਼ਾ/ਸੰਖੇਪ ਸਾਰ ਜਾਂ ਲੇਖ ਵਿੱਚੋਂ ਕੋਈ ਹੋਰ ਸਰਲ ਪ੍ਰਸ਼ਨ (ਪੰਜ ਵਿੱਚੋਂ ਦੋ) $2 \times 08 = 16$

ਅੰਕ

3. ਨਿੱਜੀ ਜਾਂ ਕਾਰੋਬਾਰੀ ਚਿੱਠੀ।

(ਤਿੰਨ ਵਿੱਚੋਂ ਇੱਕ) 09

ਅੰਕ

4. ਪੰਜਾਬੀ ਮੁਢਲਾ ਗਿਆਨ ਭਾਗ iii ਪੁਸਤਕ ਵਿਚ ਦਰਜ ਬਹੁਤੇ ਸਬਦਾਂ ਦੀ ਥਾਂ ਇਕ ਸਬਦ। (25 ਵਿੱਚੋਂ 20) $20 \times 1 = 20$ ਅੰਕ

5. ਪੰਜਾਬੀ ਮੁਢਲਾ ਗਿਆਨ ਭਾਗ iii ਪਾਠ ਪੁਸਤਕ ਤੇ ਆਧਾਰ ਸੰਖੇਪ ਉੱਤਰਾਂ ਵਾਲੇ 15 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਵਿਦਿਆਰਥੀ ਨੇ ਸਾਰੇ

ਪ੍ਰਸ਼ਨਾਂ

ਦੇ ਉੱਤਰ ਦੇਣੇ ਹੋਣਗੇ। ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਦੇ 2 ਅੰਕ ਹੋਣਗੇ।

$15 \times 2 = 30$

ਅੰਕ