

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

**SEMESTER V**

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

**SEMESTER VI**

<b>Paper</b>	<b>Title</b>	<b>Max. Marks</b>	<b>Minimum Pass Marks</b>
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  $\mu_s$  and  $\mu_{\text{eff}}$  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 ( $^1\text{H}$  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  $\text{Ca}^{+2}$ , 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  $\alpha$ -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  $\alpha$ -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  $\sigma$ ,  $\pi$  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.

**B.A/B.Sc. (COMPUTER SCIENCE) Part III**  
**Semester V**  
**2020-21, 2021-22 & 2022-23 Sessions**

**PAPER-BAP-301 : OBJECT ORIENTED PROGRAMMING USING C++**

External. Marks : 45

Maximum Time: 3 hours

Min. Pass Marks: 35%

Internal Assessment : 15

Lecturers to be delivered: 45-55 periods

**A) Instructions for paper-setter**

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 40% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 20% marks in all.

**B) Instructions for candidates**

Candidates are required to attempt two question each from sections A & B of the question paper and the entire section C.

**Section-A**

**Evolution of OOP** : Procedure Oriented Programming, OOP Paradigm, Advantages and disadvantages of OOP over Functional Programming Approach.

**Characteristics of Object Oriented Language** : Classes, Objects, Inheritance, Reusability, User defined Data Types, Polymorphism and Exception Handling.

**Introduction to C++** : Structure of C++ Program, Identifier and keywords, Constants, Data Types, C++ Operators, Type Compatibility, Variable Declaration, Reference Variable, Statements, Expressions, Manipulators. Input and Output Statements.

**Control Statements:** Conditional Expression, Loop Statements,

**Storage Class Specifiers** : Automatic, Static, Register, Extern. Array, Pointer Arithmetic, Structures, Pointers and Structures, Unions, Bit Field Typed Enumerations.

**Function in C++** : Function Prototyping, Defining a function, Types of functions.

**Methods of Parameter passing** : by value, by address, by reference, Recursion,

**Function Overloading** : Virtual functions, pure virtual functions, operator overloading.

**Section-B**

**Classes** : Data members and member functions, objects, arrays of class objects, Objects as function arguments, nested classes, inline member functions, static data members and static member functions, friend functions, dynamic memory allocation.

**Constructors and Destructors:** Default parameterized and copy constructors, multiple constructors in classes dynamic constructors. Rules for constructors and destructors, Const. objects.

**Inheritance:** single inheritance, inheriting private members, types of derivation, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance, container classes and member access control. Abstract class.

**Polymorphism** : Methods of achieving polymorphic behaviour.

**Pointers:** Pointers and classes, pointer to object, this pointer.

## References:

- 1 Herbert Schildt, *The Complete Reference C++*, Tata McGraw-Hill, 2001
- 2 Deitel and Deital, *C++ How to program*, Pearson Education 2001.
- 3 Robert Lafore, *Object Oriented Programming in Turbo C++*, Galgotia Publications, 1994.
- 4 Bajane Stautrup, *The C++ Programming Language*, Addison-Wesley Publication Co., 2001.
- 5 Stanley B. Lippman, Losee Lajoic, *C++. Primer*; Pearson Education, 2002
- 6 E. Balagurusamy, *Object-Oriented Programming with C++*, Tata McGraw-Hill, 2001
- 7 D. Ravichandran, *Programming with C++ - 2nd edition*, Tata McGraw-Hill Publishing Company Ltd.

**Paper BAP-302 : PRACTICAL BASED ON BAP-301**

Max. Marks : 40

Min. Pass Marks: 35%

Practical units to be conducted: 75

Time allowed: 3 Hours

The laboratory course will comprise of exercises to supplement what is learnt under  
Paper **OBJECT ORIENTED PROGRAMMING USING C++**

The break-up of marks for the practical will be as under:

Lab Record	:	05 marks
Viva Voce	:	10 marks
Program Development and Execution	:	25 marks

**B.A/B.Sc. (COMPUTER SCIENCE) Part III**  
**Semester VI**  
**2020-21, 2021-22 & 2022-23 Sessions**

**Paper BAP-303 - Introduction to Computer Network and Internet Programming**

External. Marks : 45

Maximum Time: 3 hours

Min. Pass Marks: 35%

Internal Assessment : 15

Lecturers to be delivered: 45-55 periods

**A) Instructions for paper-setter**

The question paper will consist of three sections A, B & C. Sections A & B will have four questions from the respective sections of the syllabus and will carry 40% marks each. Section C will have 6-12 short answer type questions which will cover the entire syllabus uniformly and will carry 20% marks in all.

**B) Instructions for candidates**

Candidates are required to attempt two question each from sections A & B of the question paper and the entire section C.

**Section-A**

**Computer networks-** Hardware, Software, users, goals and applications of computer networks.

Types of Network: Local area networks, wide area networks, metropolitan area networks and value added networks - their features.

Transmission media: Magnetic media, twisted pair, coaxial cables, fibre optics, radio transmission, microwave transmission, infrared waves and Line of sight transmission, Cellular radio and communication Satellites.

**Internet:** What is Internet, its advantages, disadvantages, internet facilities through WWW and HTML, Internet Protocols, TCP/IP, FTP, newsgroups, remote logins, chat groups etc.

WWW: the client side, the server side, web browsers, web pages, locating information on the web.

E-Mail: architecture, various aspects, the user agent, message format, message transfer, e-mail privacy.

Network Security: Various threats, prevention and solutions.

**Section-B**

**HTML:** Introduction to HTML, SGML, Internet and Web structure of HTML document.

Starting an HTML document: Head element, body element, style element, Script element, Text formatting, using lists to organise information.

Organising Data with Table: Basic table Structures, individual cells and headings, vertical controls, database considerations, displaying real data with a table.

Table Layout and Presentation: Table Syntax, two column layout, staggered body with an index, traditional newspaper layout.

**Uniform Resource Locators (URLs):** Absolute URLs, Relative URLs, fragment URLs,

Types of URL Schemes- HTTP, mailto, news, FTP, Telnet, File etc.

Using Hyper Links and Anchors: Uses to Hyper Links, Structure of Hyper Links, Links to specialised contents.

Images: Adding Images to web page, using images as links, creating menus with image maps, image formats-GIF, JPEG etc.

HTML Forms: Understanding forms, creating simple GO button, fill-in-form page, form security, INPUT element, BUTTON element, SELECT element, TEXT AREA element, LABEL element, FIELDSET and LEGEND elements.

## **REFERENCES :**

1. Andrew S. Tanenbaum, "Computer Networks", Third Edition, PHI Publications, 1997.
2. Corner, Internetworking with TCP-IP: Principles, Protocols and Architecture, Prentice Hall
3. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, Prentice Hall, 1992.
4. Stephan Mack, Janan Platt, HTML 4.0 No Experience Required, BPB Publications.
5. Rick Darnell et al, HTML 4 Unleashed, Tech media Publications.

## **Paper BAP-304 : PRACTICAL BASED ON PAPER BAP\_303**

Max. Marks : 40

Min. Pass Marks: 35%

Practical units to be conducted: 75

Time allowed: 3 Hours

The laboratory course will comprise of exercises to supplement what is learnt under Paper **Introduction to Computer Network & Internet Programming** Lab exercises should cover atleast following topics:

HTML, Tables and Forms, Applying Style Sheets to HTML, General Commands of Java Script.

The break-up of marks for the practical will be as under:

Lab Record	:	05 marks
Viva Voce	:	10 marks
Programe Development and Execution	:	25 marks

**SCHEME**

**B.Sc. (Physics) Part-III (V<sup>th</sup> and VI<sup>th</sup> Semester)  
SESSION 2019-20, 2021-22 & 2022-23**

Code	Title of Paper	Total Teaching Hours	Max Marks			Examination Time (Hours)
			Total	Ext.	Int.	
<b>SEMESTER -V</b>						
Paper A	Condensed Matter Physics-I	30	40	30	10	3 Hours
Paper B	Electronics-I (Electronics and Solid State Devices)	30	40	30	10	3 Hours
Paper C	Nuclear and Radiation Physics	30	40	30	10	3 Hours
	Practicals	60	30	22	08	3 Hours
<b>SEMESTER -VI</b>						
Paper A	Condensed Matter Physics-II	30	40	30	10	3 Hours
Paper B	Electronics-II	30	40	30	10	3 Hours
Paper C	Nuclear and Particle Physics	30	40	30	10	3 Hours
	Practicals	60	30	22	08	3 Hours

### **General Instructions**

- 1) There will be three papers of theory and one laboratory (practical) course.
- 2) The number of lectures per week will be three for each theory paper.
- 3) The number of lectures per week will be six for practicals.
- 4) The examination time for each theory will be 3 hours.
- 5) The examination time for practical will also be 3 hours.
- 6) The use of non programmable calculator will be allowed in the examination centre but this will not be provided by the University/College.
- 7) Each theory paper will consist of three sections A, B and C. Section C is compulsory
- 8) Use of scientific non programmable calculator is allowed in practicals also.

#### **SECTION A**

There will be four questions. Each question will carry five marks. Two questions are to be attempted

#### **SECTION B**

There will be four questions. Each question will carry five marks. Two questions are to be attempted.

#### **SECTION C**

There will be seven questions of short answer type covering the whole syllabi. Each question will carry two marks. Any five question to be attempted.

## SEMESTER V

### PAPER A: CONDENSED MATTER PHYSICS-I

Maximum Marks: External 30  
Internal 10  
Total 40

Time Allowed: 3 Hours  
Total Teaching Hours: 30  
Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

#### Instruction for the Paper Setter

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

#### Instruction for the candidates

- 1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).
- 2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

#### Section - A

Crystal Structure. Symmetry operations for a two dimensional crystal. Two dimensional Bravais lattices, Three dimensional Bravais lattices" Basic primitive cells. Crystal planes and Miller indices. Diamond and NaCl structure. Packing fraction for Cubic and hexagonal closed packed structure.

#### Section - B

Crystal Diffraction: Bragg's Law, Experimental methods for crystal structure studies, laue equations, Reciprocal lattices of SC, BCC and FCC, Bragg's Law in reciprocal lattice. Brillouin zones and its derivation in two dimensions, Structure factor and atomic form factor.

#### Text Books

1. Introduction to Solid State Physics by C. Kittel (Wiley Eastern)
2. Elements of Modern Physics by S. H. Patil (TMGH, 1985)

#### Reference Book

1. Solid State Physics by Puri and Babbar.

## **PAPER B: ELECTRONICS-I (ELECTRONICS AND SOLID STATE DEVICES)**

Maximum Marks: External 30  
Internal 10  
Total 40

Time Allowed: 3 Hours  
Total Teaching Hours: 30  
Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

### **Instruction for the Paper Setter**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

### **Instruction for the candidates**

- 1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).
- 2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

### **Section - A**

Concept of current and voltage sources, p-n junction, Biasing of diode, V-A characteristics. Diode equation, Breakdown diodes: Zener breakdown and avalanche breakdown, Zener diode. Rectification: half wave, full wave rectifiers and bridge rectifiers, Qualitative analysis of Filter circuits (RC LC and  $\pi$  filters) Efficiency, Ripple factor, Voltage regulation. Voltage multiplier circuits.

### **Section - B**

Junction transistor: structure and working, relation between different currents in transistors, Sign conventions. Amplifying action, Different configurations of a transistor and their comparison, CB and CE characteristics.

Structure, Characteristics, operation of FET, JFET and MOSFET, Pinch off voltage, Enhancement and Depletion mode, Comparison of JFETs and MOSFETs, Difference in field effect transistor and junction type transistor.

Photo-conductive devices: Photo-conductive cell, Photodiode, Solar cell, LED, LCD.

### **Text Books**

1. Basic Electronics and Linear Circuits by N. N. Bhargave, D.C. Kulshreshtha and S. C. Gupta
2. Electronic Devices and Circuits: J. B. Gupta (Publ. KATARIA & SONS)
3. Electronic Devices and Circuits: G. K. Mithal, Khanna Publishers
4. Fundamentals of Electronics by D. Chatopadhyay, P.C. Rakshit, B. Saha and N.N.Purkit.

### **Reference Book**

Basic Electronic by D.C.Tayal (Himalaya Pub.)

## **PAPER C: NUCLEAR AND RADIATION PHYSICS**

Maximum Marks: External 30  
Internal 10  
Total 40

Time Allowed: 3 Hours  
Total Teaching Hours: 30  
Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

### **Instruction for the Paper Setter**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

### **Instruction for the candidates**

- 1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).
- 2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

### **Section - A**

Constituents of nucleus and their intrinsic properties, Qualitative facts about size, mass, density, energy, charge. Binding energy, angular momentum, magnetic moment and electric quadruple moments of the nucleus, Wave mechanical properties of nucleus, average binding energy and its variation with mass numbers, Properties of nuclear forces, Non existence of electrons in the nucleus and neutron-proton model, Liquid drop model and semi empirical mass formula, Conditions of nuclear stability, Fermi gas model. Nuclear shell model. Experimental evidence of magic numbers and its explanation.

### **Section - B**

Radioactivity. Modes of decay and successive radioactivity. Alpha emission. Electron emission, Positron emission. Electron capture, Gamma-ray emission, Internal conversion, Qualitative discussion of alpha, beta and gamma spectra, Geiger-Nuttal rule, Neutrino hypothesis of beta decay. Evidence of existence of neutrino, Qualitative discussion of alpha and beta decay theories, Nuclear reactions. Reaction cross section, Conservation laws. Kinematics of nuclear reaction, Q-value and its physical significance, Compound nucleus, Possible reaction with high energy particles.

### **Text Books**

1. An Introduction to Nuclear Physics by M.R. Bhiday and V.A. Joshi (Orient Longman)
2. Introductory Nuclear Physics by D.C.Tayal (Himalaya Pub.)

### **Reference Books**

1. Nuclear Physics by I. Kaplan (Addision-Wiley Pub. Co. Inc.)
2. Nuclear Physics by Burcham (Indian Ed.)
3. Concepts of Nuclear Physics by B.L. (Cohen (TMI Ed.)

**Semester- V**  
**PRACTICALS**

Maximum Marks: External 22  
Internal 08  
Total 30

Time Allowed: 3 Hours  
Pass Marks: 35%  
Total Teaching Hours: 60

1. The student will be asked to perform one experiment out of the experiments mentioned in the syllabus.
2. The distribution of marks is as follows:
  - (i) One full experiment requiring the student to take some data, analyse it and draw conclusions-(candidates are expected to state their results with limits of error. (10)
  - (ii) Brief theory (04)
  - (iii) Viva-Voce (04)
  - (iv) Record (Practical File) (04)
3. There will be one session of 03 hours duration. The paper will consist of 06 experiments out of which an examinee will mark 04 experiments and one of these is to be allotted by the external examiner.
4. Number of candidates in a group for practical examination should not exceed 12.
5. In a single group no experiment is allotted to more than three students in any group.
6. The student should determined Standard Deviations and probable error in the calculations whereas needed.

**LIST OF EXPERIMENTS**

1. Measurement of reverse saturation current in p-n junction diode at various temperatures and to find the approximate value of energy gap.
2. To draw forward and reverse bias characteristics of a p-n junction diode and draw a load line.
3. Study of a diode as clipping element.
4. To show the variation of resistance of a thermistor with temperature
5. To measure the efficiency and ripple factors for a) Half-wave (b) full wave and (C) bridge rectifier circuits.
6. To study the reduction in the ripple in the rectified output with RC. LC and  $\pi$  - filters.
7. To draw the characteristics of a Zener diode
8. To study the stabilization of output voltage of a power supply with Zener diode.
9. To Plot common Emitter Characteristics of a transistor (pnp or npn)
10. To study the response of RC circuit to various input voltage (square, sine and triangular)
11. To draw output and mutual Characteristics of an FET and determine its parameters

**Text and Reference Books**

1. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal.
2. B.Sc. Practical Physics, C.L. Arora.

## SEMESTER VI

### PAPER A: CONDENSED MATTER PHYSICS-II

Maximum Marks: External 30  
Internal 10  
Total 40

Time Allowed: 3 Hours  
Total Teaching Hours: 30  
Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

#### Instruction for the Paper Setter

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

#### Instruction for the candidates

- 1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).
- 2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

#### Section - A

Lattice vibrations, Concepts of phonons, Scattering of protons by phonons. Vibration of mono-atomic, di-atomic, linear chains. Density of modes, Einstein and Debye models of specific heat, Free electron model of metals. Free electron, Fermi gas and Fermi energy.

#### Section - B

Band theory, Kronig-Penney Model. Metals and insulators, Conductivity and its variation with temperature in semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Qualitative discussion of band gap in semiconductors, superconductivity, Magnetic field effect in superconductors, BCS theory. Thermal properties of superconductors

#### Text Books

1. Introduction to Solid State Physics by C. Kittel (Wiley Eastern)
2. Elements of Modern Physics by S. H. Patil (TMGH, 1985)

#### Reference Book

1. Solid State Physics by Puri and Babbar.

## **PAPER B: ELECTRONICS-II**

Maximum Marks: External 30  
Internal 10  
Total 40

Time Allowed: 3 Hours  
Total Teaching Hours: 30  
Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

### **Instruction for the Paper Setter**

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

### **Instruction for the candidates**

- 1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).
- 2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

### **SECTION-A**

Thyristor, SCR, TRIAC, DIAC: Construction, Characteristics and Operation; Comparison between transistors and thyristors; Difference between SCR and TRIAC.

UJT: its construction, Equivalent circuit, Characteristics and parameters, uses.

Thermistor: Types, Construction, Characteristics, Uses, Advantages over other temperature sensing devices

IMPATT and TRAPATT devices, PIN diode: Construction, Characteristics, Applications.

### **SECTION-B**

Gunn effect and diodes: Mechanism, Characteristic, Negative differential resistivity and Domain formation

Tunnel diode: Tunneling Phenomenon, Operation, Applications. Merits and Drawbacks

Transistor biasing: Stabilization of operating point, Fixed bias, Collector to base bias, Bias circuit with emitter resistor, Voltage divider biasing circuit.

CE amplifier: Working and analysis using h-parameters, Equivalent circuits, Determination of current gain, Power gain, Input impedance, FET amplifier: Voltage, Current and Power gain

Feed back in amplifiers: Types & advantage of negative feedback. Emitter follower as negative feed back circuit.

### **Text Books**

1. Basic Electronics and Linear Circuits by N. N. Bhargave, D.C. Kulshreshtha and S. C. Gupta
2. Electronic Devices and Circuits: J. B. Gupta (Publ. KATARIA & SONS)
3. Electronic Devices and Circuits: G. K. Mithal, Khanna Publishers
4. Fundamentals of Electronics by D. Chatopadhyay, P.C. Rakshit, B. Saha and N.N.Purkit.

### **Reference Book**

Basic Electronic by D.C.Tayal (Himalaya Pub.)

## PAPER C: NUCLEAR AND PARTICLE PHYSICS

Maximum Marks: External 30  
Internal 10  
Total 40

Time Allowed: 3 Hours  
Total Teaching Hours: 30  
Pass Marks: 35%

Out of 40 Marks, internal assessment (based on two mid-semester tests/ internal examination, written assignment/project work etc. and attendance) carries 10 marks, and the final examination at the end of the semester carries 30 marks.

### Instruction for the Paper Setter

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from respective sections of the syllabus. Section C will have 07 short answer type questions (Candidate is to attempt any five questions), which will cover the entire syllabus uniformly. Each question of sections A and B carry 05 marks. Section C will carry 10 marks.

### Instruction for the candidates

- 1) Candidates are required to attempt two questions each from section A and B, and the entire section C is compulsory and Consist of seven questions (Candidate is to attempt any five questions).
- 2) Use of non programmable calculator is allowed in the examination centre but this will not be provided by the University/College.

### SECTION-A

Energy loss due to ionization (Bethe's formula), Energy loss of electrons, Bremsstrahlung, Interactions of gamma rays with matter. Radiation loss by fast electrons, Radiation length, Electron-positron annihilation, Cyclotron. Betatron, Qualitative discussion of Synchrotron, Collider machines and linear accelerator.

### SECTION-B

Ionization chamber, Proportional counter, GM counter, Scintillation counter, Solid state detectors, Elementary particles and their masses, Decay modes, Classification of these particles, types of interactions. Conservation laws and quantum numbers, Concepts of isospin. Strangeness, Parity, Charge conjugation. Antiparticles, Gell-Man method, Decay and strange particles. Particle symmetry, Introduction to quarks and qualitative discussion of the quark model.

### Text Books

1. An Introduction to Nuclear Physics by M. R. Bhiday and V. A. Joshi (Orient Longman)
2. Introductory Nuclear Physics by D.C.Tayal (Himalaya Pub.)

### Reference Books

1. Nuclear Physics by I. Kaplan (Addison-Wiley Pub. Co. Inc.)
2. Nuclear Physics by Burcham (Indian Ed.)
3. Concepts of Nuclear Physics by B.L. Cohen (TMI Ed.)
4. Particle Physics, M. P. Khanna (Prentice Hall of India)

## SEMESTER VI

### PRACTICALS

Maximum Marks:	External	22
	Internal	08
	Total	30

Time Allowed: 3 Hours  
Pass Marks: 35%  
Total Teaching Hours: 60

1. The student will be asked to perform one experiment out of the experiments mentioned in the syllabus.
2. The distribution of marks is as follows:
  - (i) One full experiment requiring the student to take some data, analyse it and draw conclusions-(candidates are expected to state their results with limits of error. (10)
  - (ii) Brief theory (04)
  - (iii) Viva-Voce (04)
  - (iv) Record (Practical File) (04)
3. There will be one session of 03 hours duration. The paper will consist of 06 experiments out of which an examinee will mark 04 experiments and one of these is to be allotted by the external examiner.
4. Number of candidates in a group for practical examination should not exceed 12.
5. In a single group no experiment is allotted to more than three students in any group.
6. The student should determine Standard Deviations and probable error in the calculations where needed.

### LIST OF EXPERIMENTS

1. To measure the magnetic susceptibility of  $\text{FeCl}_2$  solution by Quinck's method
2. To trace the B-H curves for different materials using CRO and find the magnetic parameters from these.
3. Study of a diode as clamping element
4. To Plot common base Characteristics and determine h-parameters of a given transistor
5. To study the characteristics of a thermistor and find its parameters.
6. To study the gain of an amplifier at different frequencies and to find band width and gain bandwidth product.
7. To draw the plateau of a GM counter and find its operating voltage
8. To study the statistical fluctuations of G.M. Counter to find its standard deviation.
9. To study the absorption of beta particles in aluminum using GM counter and determine the absorption coefficient of beta particles from it.
10. To study the energy resolution and calibration of a scintillation counter.
11. To plot the complete gamma ray spectrum of  $^{137}\text{Cs}$  and mark the different peaks of the spectrum

### Text and Reference Books

1. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal.
2. B. Sc. Practical Physics, C. L. Arora.

**PANEL OF EXAMINERS (Theory & Practical)**

B.SC. (PHYSICS) PART-III (V<sup>th</sup> & VI<sup>th</sup> SEMESTER)

SESSION 2016-17, 2017-18, 2018-19

**PAPER A: Condensed Matter Physics-I**

**PAPER A: Condensed Matter Physics-II**

- 1 Dr. Manjitinder Kaur,  
Department of Physics, Govt. Mohindra College, Patiala.  
Mobile No: 94179-76418
- 2 Dr. Makhan Singh,  
Department of Physics, Govt. Rajindra College, Bathinda.  
Mobile No : 98154-92001
- 3 Dr. Gurdeep Singh Sekhon  
Department Of Physics, Govt. College, Mohali.  
Mobile No : 98882-89101
- 4 Professor Inderjit Singh ,  
Department of Physics, Govt. College, Ropar.  
Mobile No 98767-85054
- 5 Dr. Harvinder Singh ,  
Department of Physics, Govt. Ripudman College, Nabha.  
Mobile No 95017-58600
- 6 Professor Anoop Kaur Sandhu,  
Department of Physics, Govt. Barjindra College, Faridkot.  
Mobile No 98159-69439
- 7 Dr. Baljit Singh,  
Department of Physics, Khalsa College, Bela.  
Mobile No 98149-26827
- 8 Dr.Veena Verma,  
Department of Physics, Govt. Shivalik College Naya Nangal.  
Mobile No : 98726-58833
- 9 Professor B.S. Satyal,  
Department of Physics, Govt.College Ropar.  
Mobile : 94170-22131

**PAPER B: Electronics-I (Electronics and Solid State Devices)**

**PAPER B: Electronics-II**

- 1 Dr. Manju Midha,  
Department of Physics, Govt. Mahindra College, Patiala.  
Mobile No 98723-75737
- 2 Dr.Harvinder Singh,  
Department of Physics, Govt. Ripudaman College, Nabha.  
Mobile No 950175-8600
- 3 Professor Harjinder Singh,  
Department of Physics, Govt. Rajindra College, Bathinda.  
Mobile No : 98157-29166
- 4 Dr.Meera Rani,  
Department of Physics, Govt. College, Ropar.  
Mobile No : 94175-90982
- 5 Dr. M.P.Singh,  
Department of Physics, Guru Kashi College, Damdama Sahib.  
Mobile No : 94170-67792

- 6 Professor Jatinder Singh Gill,  
Department of Physics, Govt.College, Ropar  
Mobile No 81460-22995.
- 7 Professor Harpal Kaur,  
Department of Physics, Govt. Mohindra College, Patiala  
Mobile No : 977791-73989
- 8 Dr. Makhan Singh  
Department of Physics, Govt. Rajindera College, Bathinda  
Mobile No. 98154-92001
- 9 Dr. Manjitinder Kaur,  
Department of Physics, Govt. Mohindra College, Patiala  
Mobile No 94179-76418
- 10 Dr. Gurdeep Singh Sekhon  
Department of Physics, Govt. College Mohali.  
Mobile No: 98882-89101

**Paper C: Nuclear and Radiation Physics**

**Paper C: Nuclear and Particle Physics**

- 1 Professor Joginder Singh Batra,  
Department of Physics, Govt. College, Mohali.  
Mobile No : 98158-46609
- 2 Dr.Harvinder Singh,  
Department of Physics, Govt. Ripudaman College, Nabha.  
Mobile No 950175-8600
- 3 Professor Anup Kaur Sandhu,  
Department of Physics, Govt. Barjindra College, Faridkot.  
Mobile No : 98159-69439
- 4 Professor Jatinder Singh Gill,  
Department of Physics, Govt. College,Ropar.  
Mobile No : 8146022995
- 5 Dr. Gurdeep Singh Sekhon  
Department of Physics, Govt. College Mohali.  
Mobile No: 98882-89101
- 6 Dr. Makhan Singh  
Department of Physics, Govt. Rajindera College, Bathinda  
Mobile No. 98154-92001
- 7 Dr. M.P.Singh,  
Department of Physics, Guru Kashi College, Damdama Sahib.  
Mobile No : 94170-67792
- 8 Dr. Baljit Singh,  
Department of Physics, Khalsa College, Bela.  
Mobile No 98149-26827
- 9 Dr. Lovleen  
Department of Physics, Govt. College for Women, Patiala.  
Mobile No : 98147- 15350
10. Surinder Singla  
Department of Physics, Govt. Ranbir College, Sangrur,  
Cell No. 9417383906

## PRACTICALS

1. Mrs. Manjitinder Kaur,  
Department of Physics, Govt. Mahindra College, Patiala. Mobile: 98153 16929
2. Dr.Makhan Singh,  
Department of Physics, Govt. Rajindra College, Bathinda. Mobile: 98154 92001
3. Dr. Gurdeep Singh Sekhon  
Department of Physics, Govt. College, Mohali. Mobile: 988828 89101
4. Dr. Harvinder Singh ,  
Department of Physics, Govt. Ripudman College, Nabha. Mobile: 950175-8600
5. Mr. B.S. Stayal,  
Department of Physics, Govt.College Ropar. Mobile: 94170 22131
6. Dr. Gurpreet Singh  
Department of Physics, DAV College Bathinda.
7. Dr. Baljit Singh  
Department of Physics, Khalsa College Bela. Mobile No: 98149-26827
- 8 Mrs. Harpal Kaur,  
Department of Physics, Govt. Mohindra College, Patiala Mobile: 977791-73989
- 9 Mr. Inderjit Singh  
Department of Physics, Govt. College, Ropar Mobile: 98767-85054
- 10 Mr. Harjinder Singh Mann,  
Department of Physics, Govt. Rajindra College, Bathinda. Mobile: 98157-29166
- 11 Mr. Ravinder Singh,  
Department of Physics, Govt. Mohindra College, Patiala. Mobile: 94170-96353
- 12 Dr. Loveleen,  
Department of Physics, Govt. College for Women, Patiala. Mobile: 98147 15350
- 13 Dr.Jagdish Singh,  
Department of Physics, Guru Teg Bahadur College, Anandpur Sahib
- 14 Mrs. Anoop Kaur  
Department of Physics, Govt. College, Faridkot.
- 15 Mr. Jatinder Singh Gill,  
Department of Physics, Govt. College, Ropar. Mobile No: 81460 22995
- 16 Dr. Manjit Singh Saini,  
Department of Physics, Govt. Mohindra College, Patiala. Mobile No: 94179 76418
- 17 Dr.Meera Rani,  
Department of Physics, Govt. College, Ropar Mobile No: 94175 90982
- 18 Mr. Joginder Singh Batra,  
Department of Physics, Govt. College, Mohali. Mobile No: 98158-46609
- 19 Dr. M.P.Singh,  
Guru Kashi College, Talwandi Sabo, Mobile No : 94170-67792
- 20 Dr. Jaspal Singh,  
Department of Physics, Punjabi University Girls College, Mansa  
Mobile No: 94780 11059
- 21 Dr. Tajinder Singh  
Department of Physics, Mata Gujri College, Fatehgarh Sahib. Mobile: 97819 86678
- 22 Surinder Singla  
Department of Physics, Govt. Ranbir College, Sangrur, Cell No. 9417383906

B.A/B.Sc.- Part III

MATHEMATICS

For Sessions 2022-23, 2023-24 & 2024-25



Department of Mathematics

Punjabi University, Patiala

Noupreet Singh - -

Chanehal

A handwritten signature in blue ink, appearing to be "Vijay".

A handwritten signature in blue ink, appearing to be "Anshu".

for Head  
Mathematics Deptt.  
Punjabi University, Patiala

**B.A\B.Sc.- Vth and VI th Semester**

**MATHEMATICS**

**For Session 2022-23, 2023-24, 2024-25**

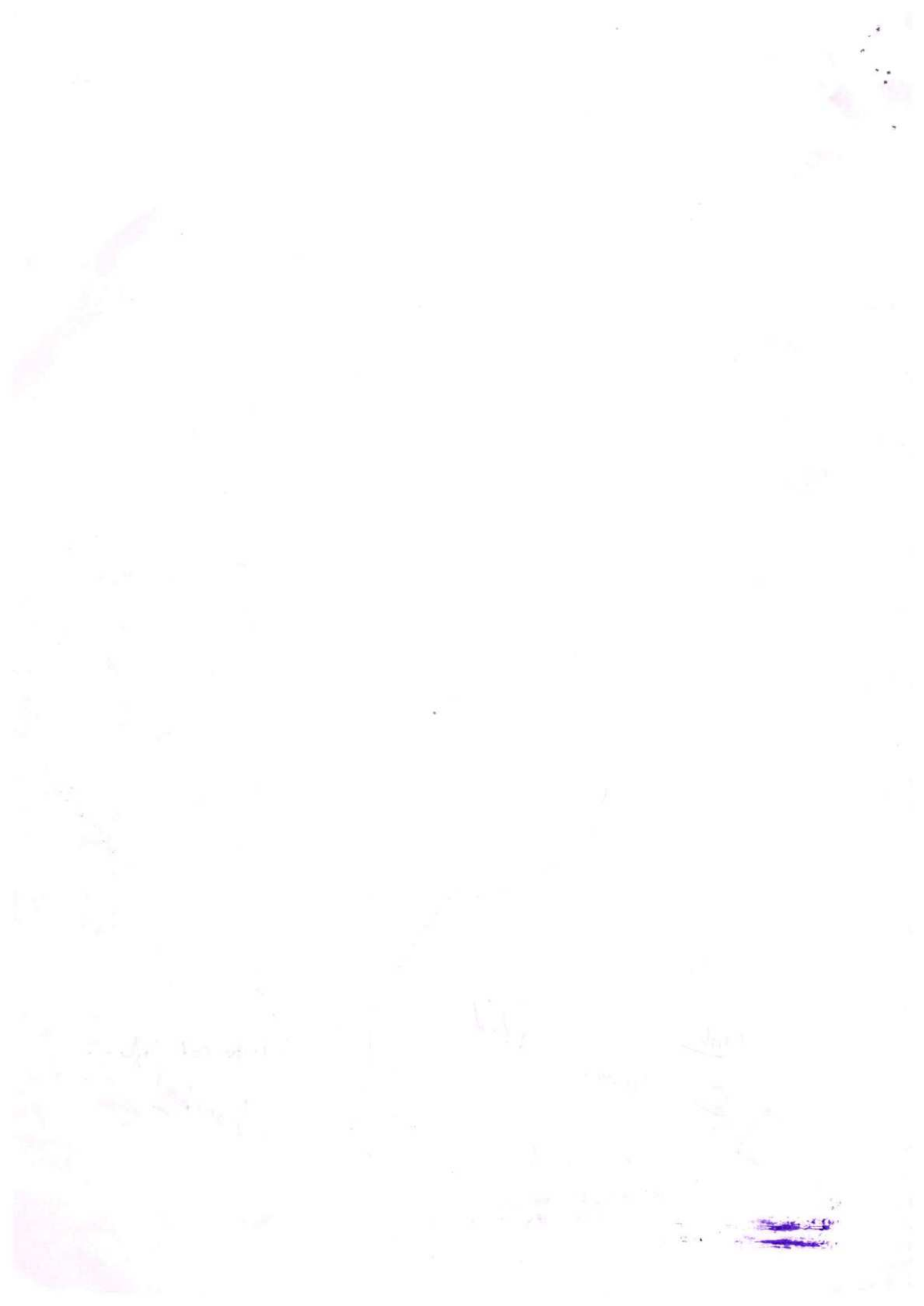
**SEMESTER-V**

Code	Title of Paper/Subject	Max. Cont. Asmt.	Marks Univ. Exam.	Total
Paper-I	Abstract Algebra	10	40	50
Paper- II	Mathematical Methods- I	10	40	50
Opt. I	Discrete Mathematics-I	10	40	50
Opt.-II	Probability Theory	10	40	50

**SEMESTER-VI**

Code	Title of Paper/Subject	Max. Cont. Asmt.	Marks Univ. Exam.	Total
Paper-III	Optimization Techniques	10	40	50
Paper- IV	Mathematical Methods-II	10	40	50
Opt. III	Discrete Mathematics- II	10	40	50
Opt. IV	Complex Variables`	10	40	50

*Erasty*  
*Ham.*  
*Abd*  
*Novpreet Singh*  
*Chanchal*  
*Kush*  
for Head Mathematics Dept. -  
Punjabi University, Patiala



## B.A\B.Sc.- V TH

### Semester

#### Paper-I: Abstract Algebra

##### For Regular Students

Maximum Marks: 50 Marks

University Exam: 40

##### For Distance Education Students/Private Students

Maximum Marks: 50 Marks (No Internal Assessment)

Maximum Time: 3 Hrs.

Teaching Hours: 50

Internal Assessment: 10

#### 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 sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

#### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

##### Section-A

**Group:** definition, examples, subgroups, counting Principle, Lagrange's theorem, Normal subgroups, Quotient groups, Homomorphisms, Fundamental theorem of homomorphism and related theorems. Cyclic Groups.

##### Section- B

**Rings:** Definition and examples of Rings, Elementary properties of Rings. Sub-rings, Homomorphism, ideals and Quotient Rings, Field of Quotient of Integral domain, division rings. Euclidean Rings, Principal ideals, examples.

##### Recommended books:

1. Text book on Algebra and Theory of equations by Chandrika Prasad.Pothishala Pvt. Ltd.
2. Herstein, I.N.: Topics in Algebra
3. Linear Algebra by Schaum Outline series.
4. Surjeet Singh and Qazi Zameeruddin: Modern Algebra (Relevant portion)



Narjeet Singh  
Chanehal



## PAPER II : MATHEMATICAL METHODS- I

**For Regular Students**

Maximum Marks: 50 Marks

University Exam: 40

**For Distance Education Students/Private Students**

Maximum Marks: 50 Marks (No Internal Assessment)

**Maximum Time: 3 Hrs.**

Teaching Hours: 50

Internal Assessment: 10

### 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 sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

#### SECTION-A

##### Laplace transforms:

Definition of Laplace transform, linearity property- Piecewise continuous function. Existence of Laplace transform, Functions of exponential order and of class A. First and second shifting theorems of Laplace transform, Change of scale property- Laplace transform of derivatives, Initial value problems, Laplace transform of integrals, Multiplication by  $t$ , Division by  $t$ , Laplace transform of periodic functions and error function; Beta function and Gamma functions. Definition of Inverse Laplace transform, Linearity property, First and second shifting theorems of inverse Laplace transform, Change of scale property, Division by  $p$ , Convolution theorem, Heaviside's expansion formula (with proofs and applications).

Narinder Singh

Ah Chahal

Vijay

for Head  
Mathematics Dept.  
Punjab University, Patiala

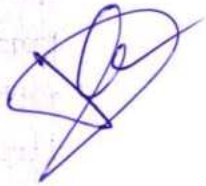


## SECTION-B

**Applications of Laplace transforms:** Applications of Laplace transforms to the solution of ordinary differential equations with constant coefficients and variable coefficients, Simultaneous ordinary differential equations, Second order Partial differential equations (Heat Equation, Wave Equation and the Laplace equation).

### Prescribed text Book:

1. Shanthi Narayan and P.K Mittal: Scope as in A course of Mathematical Analysis by, Published by S. Chand & Company,
2. A.R. Vasishtha & Dr. R.K.Gupta: Scope as in Integral transforms by Published by Krishna Prakashan Media Pvt. Ltd. Meerut.



Nandpreet Singh

Chanehal



For Head  
Mathematics Deptt.  
Punjabi University, Patiala

## Option I. Discrete Mathematics- I

### For Regular Students

Maximum Marks: 50 Marks

University Exam: 40

### For Distance Education Students/Private Students

Maximum Marks: 50 Marks (No Internal Assessment)

Maximum Time: 3 Hrs.

Teaching Hours: 50

Internal Assessment: 10

### 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 sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

#### SECTION-A

Principle of inclusion and exclusion. Computability and Formal Languages-Ordered Sets. Languages. Phrase Structure Grammars. Types of Grammars. Types of Grammars and Languages. Permutation. Combinations and Discrete Probability. Relations and Function- Binary Relations. Equivalence Relations and Partitions. Partial Order Relations and Lattices. Chains and Antichains. Pigeon Hole Principle

#### SECTION-B

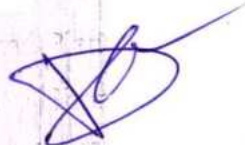
Graphs and Planar Graphs-Basic Terminology. Multigraphs. Weighted Graphs. Paths and Circuits Shortest paths. Eulerian Paths and Circuits. Travelling Salesman Problem. Planar Graphs. Trees.

#### RECOMMENDED TEXT

1. C. L. Liu, *Elements of Discrete Mathematics* (Second Edition), McGraw Hill, International Edition, Computer Science Series, 1986.
2. Dr. Babu Ram, *Discrete Mathematics*. Pearson Education India, 2012

#### REFERENCES

1. J. Glen Brookshear, *Computer Science: An Overview*, Addison-Wesley.
2. Stanley B. Lippman, Josee Lojoie, *C Primer* (3rd Edition), Addison-Wesley.



N. Ashraf S. S. S. S.  
Chandigarh



## Opt.-II : Probability Theory

### For Regular Students

Maximum Marks: 50 Marks

University Exam: 40

### For Distance Education Students/Private Students

Maximum Marks: 50 Marks (No Internal Assessment)

Maximum Time: 3 Hrs.

Teaching Hours: 50

Internal Assessment: 10

### 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 sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

#### SECTION- A

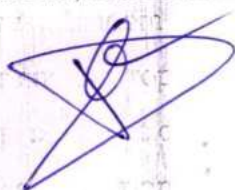
Concepts in Probability: Random Experiment, Trial, Sample Point and Sample Space, Events; Mutually Exclusive, Exhaustive, Independent and Equally Likely Events. Definition of the Probability; Classical, Relative Frequency Approach to Probability & their Demerits and Axiomatic Approach to Probability. Properties of Probability based on Axiomatic Approach, Conditional Probability, Bayes Theorem and its Applications.

#### SECTION- B

Random Variable: Definitions of Discrete Random Variables, Probability Mass Function, Continuous Random Variable, Probability Density Function. Illustrations of Random Variables and its Properties, Expectation of a Random Variable and its Properties, Moments, Measures of Location and Dispersion, Moment Generating Function and Probability Generating Function. Two Dimensional Random Variables –Joint, Marginal and Conditional Distributions (Concepts & Simple Applications) .

#### TEXT BOOKS

1. P.L. Meyer (2017). Introductory Probability and Statistical Applications, Oxford & IBH
2. Gun, A.M., Gupta, M.K., Dasgupta, B. (2016): Fundamentals of Statistics, Vol. I, World Press, Calcutta.
3. Mood A.M., Graybill F.A., and Boes D.C. (2017): Introduction to the Theory of Statistics, McGraw Hill, 3rd Edition



Na. Prakash Singh  
Chandhal Singh



Page Head  
Mathematics Dept.  
Punjabi University, Patiala



## B.A/B.Sc.- VI<sup>th</sup> Semester

Paper-III:

### Optimization Techniques

#### For Regular Students

Maximum Marks: 50 Marks

University Exam: 40

#### For Distance Education Students/Private Students

Maximum Marks: 50 Marks (No Internal Assessment)

Maximum Time: 3 Hrs.

Teaching Hours: 50

Internal Assessment: 10

#### 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 sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

#### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

#### Section-A

Inventory, Costs involved in Inventory, Variables in Inventory Models, Characteristics of Inventory Systems and Classifications, Concept of Economic Ordering (EOQ).

EOQ models with no shortage: Economic Lot Size system with uniform demand, Economic Lot Size with different rates of demand in different cycles, Economic Lot Size with finite rate of replenishment.

EOQ models with shortages: EOQ with constant rate of demand, Scheduling time constant and scheduling time variable, Production Lot size demand with shortages.

For Head  
Mathematics Deptt.  
Punjab University, Patiala

Naresh Singh,  
Chairman

Handwritten signature

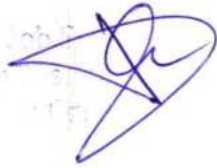
### Section-B

Introduction to Job Sequencing:  $n$  jobs on two machines,  $m$  jobs on three machines, two jobs on  $m$  machines,  $n$  jobs on  $m$  machines.

Project Networks: Critical Path Methods, Project Evaluation and Review Techniques (PERT)

#### Recommended books:

1. Churchman: *Introduction to Operation Research*, J Wiley
2. C. Mohan, K. Deep: *Optimization Techniques* New Age International (P)
3. H A Taha: *Operation Research* Pearson Education.
4. P.S Iyer: *Operation Research* Tata MacGraw Hill
5. S.D. Sharma: *Operation Research* Kedar Nath Ram Nath (India)
6. Kanti Swarup, P.K. Gupta, M. Mohan: *Operation Research* Sultan Chand and Sons, New Delhi.



Narinder Singh

Chanchal



For Head  
Mathematics Dept.  
Punjabi University, Patiala

## Paper IV : MATHEMATICAL METHODS - II

### For Regular Students

Maximum Marks: 50 Marks

University Exam: 40

### For Distance Education Students/Private Students

Maximum Marks: 50 Marks (No Internal Assessment)

Maximum Time: 3 Hrs.

Teaching Hours: 50

Internal Assessment: 10

### 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 sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

#### SECTION-A

**Fourier series** : Fourier series, Theorems, Dirichlet's conditions, Fourier series for even and odd functions, Half range Fourier series, Other forms of Fourier series

**Hankel Transform** : Hankel integral formula, Hankel transform, Inverse Theorem for Hankel transform, Hankel sine and cosine transforms and their inversion formulae. Linearity property of Hankel transforms, Change of scale property.

#### SECTION-B

**Fourier transforms and its applications**: Dirichlet's conditions, Fourier integral formula (without proof), Fourier transform, Inverse Theorem for Fourier transform, Fourier sine and cosine transforms and their inversion formulae. Linearity property of Fourier transforms, Change of scale property, Shifting theorem, Modulation theorem, Convolution theorem of Fourier transforms, Parseval's identity, Finite Fourier sine transform, Inversion formula for sine transform, Finite Fourier cosine Transform, Inversion formula for cosine transform. Applications to solve some model equations: One dimensional heat equation, one dimensional wave equation.



Nashrath Singh  
Chanehal



**Prescribed text Book:**

1. Shanthi Narayan and P.K Mittal: Scope as in A course of Mathematical Analysis by, Published by S. Chand & Company,
2. A.R. Vasishtha & Dr. R.K.Gupta: Scope as in Integral transforms by Published by Krishna Prakashan Media Pvt. Ltd. Meerut.



Nandpreet Singh :-

Chandhal



For

Head  
Mathematics Deptt.  
Punjab University, Patiala





### Option III: Discrete Mathematics - II

**For Regular Students**

Maximum Marks: 50 Marks

University Exam: 40

**For Distance Education Students/Private Students**

Maximum Marks: 50 Marks (No Internal Assessment)

**Maximum Time: 3 Hrs.**

Teaching Hours: 50

Internal Assessment: 10

#### 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 sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

#### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section

#### SECTION - A

Analysis of Algorithms-Time Complexity. Complexity of Problems. Discrete Numeric Functions and Generating Functions. Recurrence Relations and Recursive Algorithms Linear Recurrence Relations with Constant Coefficients. Homogeneous Solutions. Particular Solution. Total Solution. Solution by the Method of Generating Functions.

#### SECTION-B

Boolean Algebras-Lattices and Algebraic Structures. Duality. Distributive and Complemented Lattices. Boolean Lattices and Boolean Algebras. Boolean Functions and Expressions. Propositional Calculus. Design and Implementation of Digital Networks. Switching Circuits.

#### RECOMMENDED TEXT

C. L. Liu, *Elements of Discrete Mathematics* (Second Edition), McGraw Hill, International Edition, Computer Science Series, 198

for

Head  
Mathematics Dept.  
Punjabi University, Patiala

Chandhal  
N. J. Singh



## OPTIONAL PAPER

### Opt.-IV: Complex Variables

#### For Regular Students

Maximum Marks: 50 Marks

University Exam: 40

#### For Distance Education Students/Private Students

Maximum Marks: 50 Marks (No Internal Assessment)

Maximum Time: 3 Hrs.

Teaching Hours: 50

Internal Assessment: 10

### 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 sections of the syllabus and Section C will consist of one compulsory question having eight short answer type questions covering the entire syllabus uniformly. The weightage of Section A and B will be 60% and that of Section C will be 40%

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

#### Section A

Polar forms of complex numbers, roots of complex numbers, Euler's formula,  $n$ th roots of unity, Vector interpretation and Spherical representation of complex numbers, Stereographic Projection and Complex Conjugate Coordinates. Inverse Functions, Transformations, Curvilinear Coordinates, Branch Point and Branch Lines, Riemann Surfaces, Derivatives.

#### Section B

Analytic Functions, Cauchy Riemann Equations, Harmonic Functions, Singular Points, Orthogonal Families, and the Complex Differential Operators, Simply and Multiply Connected Regions, Complex Line Integrals, Greens Theorem in the Plane, Cauchy's Theorem, Cauchy Goursat Theorem.

#### Recommended Text:

1. Complex Analysis (2nd Edition) – L. V. Ahlfors, McGraw-Hill International Student Edition, 1990.
2. An Introduction to the Theory of functions of a complex Variable – E. T. Copson, Oxford university press, 1995.
3. *Complex Variables* by Murray R. Spiegel, Schaum's Outline Series



Narinder Singh  
Chandhok



Prof. Gurdip  
Head  
Mathematics Deptt.  
Punjabi University, Patiala

5

## 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।

## ਸਹਾਇਕ ਪਾਠ-ਸਾਮੱਗਰੀ

1. ਦੁਨੀ ਚੰਦਰ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦਾ ਵਿਆਕਰਨ, ਪੰਜਾਬ ਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ੍ਹ, 1964
2. ਡਾ. ਹਰਕੀਰਤ ਸਿੰਘ, ਰੁਪਾਂਤਰੀ ਵਿਆਕਰਣ, ਪੰਜਾਬ ਸਟੇਟ ਯੂਨੀਵਰਸਿਟੀ ਟੈਕਸਟ ਬੁੱਕ ਬੋਰਡ ਚੰਡੀਗੜ੍ਹ।
3. ਪੁਆਰ, ਜੇਗਿੰਦਰ 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. ਡਾ. ਬਲਦੇਵ ਸਿੰਘ ਚੀਮਾ, ਪੰਜਾਬੀ ਵਾਕ ਬੰਧ: ਬਣਤਰ ਅਤੇ ਕਾਰਜ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।
7. ਬਟਾ ਸਿੰਘ ਬਰਾੜ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਸਾਹਿਤ : ਭਾਸ਼ਾਈ ਸਰੋਕਾਰ, ਦੀਪਕ ਪਬਲਿਸ਼ਰਜ਼, ਜਲੰਧਰ, 2010
8. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ : ਸੋਤ ਤੇ ਸਰੂਪ, ਵਾਰਿਸਸ਼ਾਹ ਫਾਊਂਡੇਸ਼ਨ, ਅੰਮ੍ਰਿਤਸਰ, 2004.
9. ਬੂਟਾ ਸਿੰਘ ਬਰਾੜ, ਪੰਜਾਬੀ ਵਿਆਕਰਨ : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ, 2008
10. ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਸਾਹਿਤ ਰੂਪਾਕਾਰ: ਸਿਧਾਂਤ ਤੇ ਰੂਪਾਂਤਰਣ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।
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

ਓ) 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 ਦੇ 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 - ਅ**

2. ਓ) ਅਨੁਵਾਦ ਸਿਧਾਂਤ, ਪ੍ਰਕਾਰਜ ਅਤੇ ਵੰਨਗੀਆਂ ਬਾਰੇ ਕੋਈ ਦੇ 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, ਜੇਗਿੰਦਰ 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





(ਹ) ਫਲਾਂ-ਸਬਜ਼ੀਆਂ ਦੇ ਨਾਂ

(ਕ) ਪਸ਼ੂ-ਛਪੰਛੀਆਂ ਦੇ ਨਾਂ

(ਖ) ਪੰਜਾਬੀ ਰਿਸ਼ਤਾ-ਨਾਤਾ ਪ੍ਰਬੰਧ ਦੀ ਸ਼ਬਦਾਵਲੀ

(ਗ) ਘਰੇਲੂ ਵਸਤਾਂ ਦੀ ਸ਼ਬਦਾਵਲੀ

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ਭਾਗ-ੲ ਸਾਰੇ ਪਾਠਕ੍ਰਮ ਤੇ ਆਧਾਰਿਤ ਆਬਜੈਕਟਿਵ ਟਾਈਪ / ਸੰਖੇਪ ਉਤਰਾਂ ਵਾਲੇ ਪ੍ਰਸ਼ਨ।

15x2=30 ਅੰਕ

#### ਅੰਕ ਵੰਡ ਤੇ ਪੇਪਰ ਸੈਂਟਰ ਲਈ ਹਦਾਇਤਾਂ

1. ਵਿਦਿਆਰਥੀ ਪਹਿਲੀ ਵਾਰ ਗੁਰਮੁਖੀ ਲਿਪੀ ਸਿੱਖ ਰਹੇ ਹਨ। ਹੋ ਸਕਦਾ ਹੈ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੋਂ ਅਨਜਾਣ ਹੋਣ। ਸੋ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਪੱਧਰ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਸੀਮਾ ਨੂੰ ਧਿਆਨ ਵਿੱਚ ਰੱਖ ਕੇ ਨਿਸ਼ਚਤ ਕੀਤਾ ਜਾਵੇ।
2. ਸਾਰੇ ਭਾਗਾਂ ਵਿੱਚੋਂ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣ।
3. ਸਰਲ ਤੇ ਸਪਸ਼ਟ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣ।
4. ਵਰਣਾਤਮਕ ਪ੍ਰਸ਼ਨ ਨਾ ਪੁੱਛੇ ਜਾਣ।
5. ਵਿਦਿਆਰਥੀ ਨੂੰ ਲਿਪੀ ਦਾ ਬੋਧ ਕਰਵਾਉਣ ਲਈ ਧੁਨੀਆਂ, ਲਿਪੀ ਚਿੰਨ੍ਹਾਂ ਦੀ ਪਛਾਣ ਅਤੇ ਵਰਤੋਂ ਸਬੰਧੀ ਸੰਖੇਪ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣ। ਲੋੜ ਅਨੁਸਾਰ ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਛੋਟੇ ਜਾਂ ਚੋਟੇ ਦੇਣ ਦੀ ਲਾਜ਼ਮੀ ਹੈ।
6. ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ ਦੇ ਸਾਰੇ ਭਾਗਾਂ ਵਿੱਚੋਂ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣ। ਲੋੜ ਅਨੁਸਾਰ ਚੋਣ ਅਤੇ ਛੋਟੇ ਦਿੱਤੀ ਜਾਵੇ।

#### ਸਹਾਇਕ ਪਾਠ ਸਮੱਗਰੀ

1. ਸਤਿਨਾਮ ਸਿੰਘ ਸੰਧੂ, ਆਓ ਪੰਜਾਬੀ ਸਿਖੀਏ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2009. (ਹਿੰਦੀ ਤੋਂ ਪੰਜਾਬੀ ਸਿੱਖਣ ਲਈ)
2. ਸਤਿਨਾਮ ਸਿੰਘ ਸੰਧੂ, ਗੁਰਮੁਖੀ ਸਿੱਖੇ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2011. (ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ ਸਿੱਖਣ ਲਈ)
3. ਸੀਤਾ ਰਾਮ ਬਾਹਰੀ, ਪੰਜਾਬੀ ਸਿਖੀਏ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2002 (ਹਿੰਦੀ)
4. ਰਾਜਵਿੰਦਰ ਸਿੰਘ, ਪੰਜਾਬੀ ਗਿਆਨ ਸੀ.ਡੀ. (ਕੰਪਿਊਟਰ ਐਪਲੀਕੇਸ਼ਨ ਟੂ-ਲਰਨ ਐਂਡ ਟੀਚ ਪੰਜਾਬੀ), ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ 2011.
5. Hardev Bahri, Teach Yourself Punjabi, Publication Bureau, Punjabi University, Patiala, 2011.
6. Henry A. Gleason and Harjeet Singh Gill, A Start in Punjabi, Publication Bureau, Punjabi University, Patiala, 1997.
7. Ujjal Singh Bahri and Paramjit Singh Walia, Introductory Punjabi, Publication Bureau, Punjabi University, Patiala, 2003.

ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਮੁੱਢਲਾ ਗਿਆਨ) ਭਾਗ-ਪਹਿਲਾ  
(ਅੰਡਰ-ਗ੍ਰੈਜੂਏਟ ਪੱਧਰ ਦੇ ਸਾਰੇ ਕੋਰਸਾਂ ਲਈ ਸਾਂਝਾ ਸਿਲੇਬਸ)

2020-21, 2021-22 ਅਤੇ 2022-23 ਸੈਸ਼ਨ ਲਈ

ਰੈਗੂਲਰ ਵਿਦਿਆਰਥੀਆਂ ਲਈ

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, 6 ਪੀਰੀਅਡ ਪ੍ਰਤੀ ਹਫ਼ਤਾ)

ਭਾਗ-ਓ (1). ਸ਼ਬਦ ਪ੍ਰਬੰਧ: ਸ਼ਬਦ ਜੋੜਾਂ ਦੀ ਵਰਤੋਂ

(ੳ) ਦੋ ਅੱਖਰੀ ਸ਼ਬਦਾਂ ਦੇ ਸ਼ਬਦ-ਜੋੜ

(ਅ) ਤਿੰਨ ਅੱਖਰੀ ਸ਼ਬਦਾਂ ਦੇ ਸ਼ਬਦ-ਜੋੜ

(ੲ) ਬਹੁ ਅੱਖਰੀ ਸ਼ਬਦਾਂ ਦੇ ਸ਼ਬਦ-ਜੋੜ

15 ਅੰਕ

(2). ਸ਼ਬਦਾਂ ਦੀਆਂ ਸ਼ਰੇਣੀਆਂ ਤੇ ਵਿਆਕਰਨਕ ਵਰਗਾਂ ਦੀ ਪਛਾਣ

(ੳ) ਸ਼ਬਦਾਂ ਦੀਆਂ ਸ਼ਰੇਣੀਆਂ ਦਾ ਸਿਧਾਂਤ, ਪਛਾਣ ਤੇ ਵਰਤੋਂ (ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ ਆਦਿ)

(ਅ) ਵਿਆਕਰਨਕ ਵਰਗਾਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ (ਲਿੰਗ, ਵਚਨ, ਪੁਰਖ, ਕਾਲ ਆਦਿ)

10 ਅੰਕ

ਭਾਗ-ਅ (1). ਸ਼ਬਦ ਬਣਤਰਾਂ ਤੇ ਵਿਆਕਰਨਕ ਇਕਾਈਆਂ ਦਾ ਸਿਧਾਂਤ ਤੇ ਵਰਤੋਂ

(ੳ) ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰਾਂ ਦਾ ਸਿਧਾਂਤ, ਪਛਾਣ ਤੇ ਵਰਤੋਂ (ਅਗੇਤਰ, ਪਿਛੇਤਰ, ਸਮਾਸ, ਦੁਹਰੁਕਤੀ)

(ਅ) ਵਿਆਕਰਨਕ ਇਕਾਈਆਂ ਦਾ ਸਿਧਾਂਤ, ਪਛਾਣ ਤੇ ਵਰਤੋਂ (ਵਾਕੰਸ਼, ਉਪ-ਵਾਕ ਤੇ ਵਾਕ)

(ੲ) ਸ਼ਬਦਾਂ ਦਾ ਵਿਆਕਰਨਕ ਮੇਲ: ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ

10 ਅੰਕ

(2). ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹਾਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ।

10 ਅੰਕ

ਭਾਗ-ੲ ਸਾਰੇ ਪਾਠਕ੍ਰਮ ਤੇ ਆਧਾਰਿਤ ਆਬਜੈਕਟਿਵ ਟਾਈਪ / ਸੰਖੇਪ ਉਤਰਾਂ ਵਾਲੇ ਪ੍ਰਸ਼ਨ।

15x2=30 ਅੰਕ

ਅੰਕ ਵੰਡ ਤੇ ਪੇਪਰ ਸੈਂਟਰ ਲਈ ਹਦਾਇਤਾਂ

1. ਵਿਦਿਆਰਥੀ ਪਹਿਲੀ ਵਾਰ ਗੁਰਮੁਖੀ ਲਿਖੀ ਸਿੱਖ ਰਹੇ ਹਨ। ਹੋ ਸਕਦਾ ਹੈ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੋਂ ਅਨਜਾਣ ਹੋਣ। ਸੋ

ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਪੱਧਰ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਸੀਮਾ ਨੂੰ ਧਿਆਨ ਵਿੱਚ ਰੱਖਕੇ ਨਿਸ਼ਚਤ ਕੀਤਾ ਜਾਵੇ।

2. ਸਾਰੇ ਭਾਗਾਂ ਵਿੱਚੋਂ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣ।

3. ਸਰਲ ਤੇ ਸਪਸ਼ਟ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣ।

4. ਵਰਣਾਤਮਕ ਪ੍ਰਸ਼ਨ ਨਾ ਪੁੱਛੇ ਜਾਣ।

5. ਵਿਦਿਆਰਥੀਆਂ ਨੂੰ ਵਿਆਕਰਨ ਦੀ ਮੁੱਢਲੀ ਜਾਣਕਾਰੀ ਸਬੰਧੀ ਸੰਖੇਪ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣ। ਲੋੜ ਅਨੁਸਾਰ ਵਿਦਿਆਰਥੀ ਨੂੰ ਛੋਟੇ ਜਾਂ ਚੋਣ ਦੇਣੀ ਲਾਜ਼ਮੀ ਹੈ।

ਸਹਾਇਕ ਪਾਠ ਸਮੱਗਰੀ

1. ਸਤਿਨਾਮ ਸਿੰਘ ਸੰਧੂ, ਆਓ ਪੰਜਾਬੀ ਸਿਖੀਏ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2009. (ਹਿੰਦੀ ਤੋਂ ਪੰਜਾਬੀ ਸਿੱਖਣ ਲਈ)
2. ਸਤਿਨਾਮ ਸਿੰਘ ਸੰਧੂ, ਗੁਰਮੁਖੀ ਸਿੱਖੇ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2011. (ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ ਸਿੱਖਣ ਲਈ)
3. ਸੀਤਾ ਰਾਮ ਬਾਹਰੀ, ਪੰਜਾਬੀ ਸਿਖੀਏ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2002 (ਹਿੰਦੀ)
4. ਰਾਜਵਿੰਦਰ ਸਿੰਘ, ਪੰਜਾਬੀ ਗਿਆਨ ਸੀ.ਡੀ. (ਕੰਪਿਊਟਰ ਐਪਲੀਕੇਸ਼ਨ ਟੂ-ਲਰਨ ਐਂਡ ਟੀਚ ਪੰਜਾਬੀ), ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ 2011.
5. Hardev Bahri, Teach Yourself Punjabi, Publication Bureau, Punjabi University, Patiala, 2011.
6. Henry A. Gleason and Harjeet Singh Gill, A Start in Punjabi, Publication Bureau, Punjabi University, Patiala, 1997.
7. Ujjal Singh Bahri and Paramjit Singh Walia, Introductory Punjabi, Publication Bureau, Punjabi University, Patiala, 2003.

