

FEDERAL PUBLIC SERVICE COMMISSION
(Curriculum & Research Wing)

Schemes and Syllabi for Screening/Professional Tests as well as Descriptive Examination
Relating to Posts Advertised under Consolidated Advertisement No. 05/2019

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
1.	50/2019	Research Officer (BS-17) , Nutrition Section, Ministry of Planning, Development and Reform.	Second Class or Grade 'C' Master's Degree or equivalent qualifications in Human Nutrition/ Food Technology/ Bio-Chemistry (Nutrition) or Home Economics (with specialization in Human Nutrition).	Objective Type Test (MCQ) Part-I English = 20 marks Part-II Professional Test=80 Marks	Part-I Vocabulary, Grammar Usage, Sentence Structuring. Part-II <ul style="list-style-type: none"> • Role of Nutrition in relation to Health, • Assessment of Nutritional Status, • Signs of good and poor Nutrition, • Classification, Characteristics, Food Sources, Functions and Nutritional Deficiency Problems of Carbohydrates, Proteins, Fats, Minerals, Vitamins, Fat soluble (ADEK), Water soluble (C,B1, B2, B3, B6, B9, B12) • Importance of balanced diet in relation to health. • Units of measurement for food. • Composition, Characteristics and Nutritional value of Milk, Eggs, Meat, Fish, Poultry, Vegetables and Fruits, Cereals, Pulses, Fats and Oils • Conservation of nutrients in food storage, Preparation, and cooking methods of Milk & milk products, Eggs, Meat, Vegetable & Fruits, Cereals & starch • Nutritional needs of teenage girls and boys.
2.	66/2019	Assistant Secretary (Private) (BS-16), Secretariat Training Institute, Establishment Division	<p>i. Second Class or Grade 'C' Bachelor's degree from a University recognized by HEC.</p> <p>ii. Minimum shorthand speed: 100 w.p.m. and typing speed: 50 w.p.m.</p> <p>iii. Must be computer literate.</p> <p>Note: Computer literacy means proficiency in M.S Office (M.S Word, Power Point & Excel).</p>	<ul style="list-style-type: none"> • Typing Test with minimum Speed of 50 W.P.M • Shorthand Test with minimum Speed of 100 W.P.M • Computer Literacy Test: <ul style="list-style-type: none"> i Microsoft Word (Typing, Formatting) ii Microsoft Excel (Typing, Graph, Calculations) iii Microsoft Power Point (Typing, Formatting, Inserting Objects) 	<p>35 Marks</p> <p>35 Marks</p> <p>10 Marks</p> <p>10 Marks</p> <p>10 Marks</p>

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
3.	92/2019	Draftsman-Cum-Artist (BS-16), Federal Public Service Commission.	Second Class or Grade 'C' Bachelor's Degree in Fine Arts or equivalent qualification from University recognized by HEC. OR i. Second Class or Grade 'C' Bachelor's Degree from University recognized by HEC. ii. One (1) year Diploma/ Certificate in Fine Arts/ Commercial Arts/ Draftsmanship/ Drawing. OR i. Intermediate with one (1) year Diploma/ Certificate in Graphic Arts/ Drawing. ii. Three (3) years post qualification experience in Graphics Arts/ Designing.	Objective Type Test (MCQ) Part-I English = 20 marks Part-II Professional Test=80 Marks	Part-I Grammar Usage, Sentence Structuring. Part-II <ul style="list-style-type: none"> History of Art, Design & Architecture Elements of Art Drawing & Design Theory Linear Perspective Elements & Principles of Image Making Painting: Basic elements of Art, concepts, media and formats. Printmaking: Basic elements of art and design principles, concepts, media, and formats.
4.	99/2019	Assistant Private Secretary (BS-16), Ministry of Planning, Development and Reform.	i. Second Class or Grade 'C' Bachelor's degree from a University recognized by HEC. ii. Minimum shorthand speed: 100 w.p.m. and typing speed: 50 w.p.m. iii. Must be computer literate. Note: Computer literacy means proficiency in M.S Office (M.S Word, Power Point & Excel).	<ul style="list-style-type: none"> Typing Test with minimum Speed of 50 W.P.M Shorthand Test with minimum Speed of 100 W.P.M Computer Literacy Test: <ul style="list-style-type: none"> i Microsoft Word (Typing, Formatting) ii Microsoft Excel (Typing, Graph, Calculations) iii Microsoft Power Point (Typing, Formatting, Inserting Objects) 	35 Marks 35 Marks 10 Marks 10 Marks 10 Marks
5.	129/2019	Land Acquiring Officer (BS-16), National Highways & Motorway Police, Ministry of Communications.	i. Three (3) years post Matric Diploma in Civil Technology. ii. One (1) year post qualification experience of Land Acquisition matters/ Civil Technology.	Objective Type Test (MCQ) Part-I English =20 marks Part-II Professional Test =80 marks	Part-I Grammar Usage, Sentence Structuring Part-II <ul style="list-style-type: none"> Estimation & Costing Building Material & Building Construction, Surveying & Levelling, , Concrete Technology & R.C.C Structure Design, Water Supply and Sanitary filling Aquaculture Engineering Highway Engineering Land Acquisition Act of Pakistan

**Scheme and Syllabus for Written Examination (Descriptive)
for all Posts in BS-20 advertised under Consolidated
Advertisement No. 05/2019**

Case No.	F.4-126/2019-R
Particulars of post	Director Legal Affairs (BS-20), Directorate of Legal Affairs of Pakistan Railways, (Railway Board), Ministry of Railways.
Minimum Qualification & Experience:	<ul style="list-style-type: none"> i. LLM degree or Barrister-at-Law from a University/ Institute recognized by HEC. ii. Fifteen (15) years post qualification experience as an Advocate of Supreme Court/ High Courts. iii. Computer literate in Microsoft Word, Excel and Spreadsheet. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> i. Second Class or Grade 'C' LLB degree from a University/ Institute recognized by HEC ii. Seventeen (17) years post qualification experience as an Advocate of Supreme Court/ High Courts. iii. Computer literate in Microsoft Word, Excel and Spreadsheet.

PAPER: ENGLISH (100 MARKS)

English Essay: Candidates will be required to write an Essay in English from three topics comprising approximately **2000 words**. Candidates are expected to reflect comprehensive and research based knowledge on a selected topic related to the advertised post. Candidate's articulation, expression and technical treatment of the style of English Essay writing will be examined.

OR

Case Study: Candidates will be given real situation case studies related to advertised posts/ organization concerned and will be expected from the candidates to present (i) identification of issues (ii) evaluation of issues (iii) legal or case related theories (iv) evaluation of case facts if required and (v) possible solution of the case or writing judicial order, if the case so requires.

Schemes and Syllabi for Written Examination (Descriptive) for All Posts in BS-18 & BS-19 included in Consolidated Advertisement No. 05/2019

PAPER-I: ENGLISH

Max Marks: 100

Time Allowed: 3 Hours

- (i) **English Essay-50 Marks:** Candidates will be required to write an Essay in English comprising **1500 words** from a set of **six given topics**. Candidates are expected to reflect comprehensive and research based knowledge on a selected topic. Candidate's articulation, expression and technical approach to the style of English Essay writing will be examined.

- (ii) **English (Composition and Précis)-50 Marks:**

The examination will test the candidate's abilities to handle Précis Writing, Reading Comprehension, Sentence Structuring, Translation, Grammar and Vocabulary, etc.

Précis Writing (10 marks): A selected passage with an orientation of generic understanding and enough flexibility for compression shall be given for précising and suggesting an appropriate title.

Reading Comprehension (10 marks)

A selected passage that is rich in substance but not very technical or discipline-specific shall be given, followed by five questions, each carrying 2 marks.

Grammar and Vocabulary (10 marks): Correct usage of Tense, Articles, Prepositions, Conjunctions, Punctuation, Phrasal Verbs, Synonyms and Antonyms etc.

Sentence Correction (5 marks): Ten sentences shall be given each having a clear structural flaw in terms of grammar or punctuation. The candidates shall be asked to rewrite them with really needed correction only, without marking unnecessary alterations. No two or more sentences should have exactly the same problem, and 2-3 sentences shall be based on correction of punctuation marks.

Grouping of Words (5 marks): A random list of ten words of moderate standard (neither very easy nor utterly unfamiliar) shall be given, to be grouped by the candidates in pairs of those having similar or opposite meaning, as may be clearly directed in the question.

Pairs of Words (5 marks): Five pairs shall be given of seemingly similar words with different meanings, generally confused in communication, for bringing out the difference in meaning of any five of them by first explaining them in parenthesis and then using them in sentences.

Translation (5 marks): Ten short Urdu sentences involving structural composition, significant terms and figurative/idiomatic expressions shall be given, to be accurately translated in English.

SUGGESTED READINGS

Sr. No.	Title	Author
1.	English Grammar in Use	Raymond Murphy (Cambridge University Press)
2.	Practical English Usage	M. Swan (Oxford University Press)
3.	The Little, Brown Handbook	H. Ramsey Flower & Jane Aaron (The Little, Brown & Co; Harper Collins)
4.	A University English Grammar	R. Quirk & S. Greenbaum (ELBS; Longmans)
5.	Write Better, Speak Better	Readers Digest Association
6.	Modern English in Action	Henry Christ (D.C. Heath & Co.)
7.	Exploring the World of English	Syed Saadat Ali Shah

PAPER-II: PROFESSIONAL**Max Marks: 100****Time Allowed: 3 Hours**

Case No.	F.4-93/2019-R
Particulars of post	Psychologist (BS-18) , Federal Public Service Commission
Minimum Qualification & Experience:	<p>I. Second Class or Grade 'C' Master's Degree in Psychology or Applied Psychology or equivalent qualification from a University recognized by HEC.</p> <p>II. Five (5) years post qualification experience in any of the following fields:</p> <p>i. Research. Research experience of carrying out empirical research in one of the fields/areas i.e. Psychometrics, or Clinical, or Test Construction and Measurement or Personnel Selection or Job analysis or Counseling.</p> <p>ii. Professional. Experience in Armed Forces or Public Service Commissions or other institutions engaged in work related to selection of personnel or recruitment or Test Construction and Measurement or report writing.</p> <p>iii. Teaching. Teaching experience in one of the fields/ areas i.e. Psychometrics or Clinical or Test Construction and Measurement or Organizational/Personnel Psychology or Counseling Psychology. Teaching experience should be at post graduate level.</p>

Psychology**100 Marks**

- I. **Nature and Scope of Psychology:** Definition and scope, Psychology as a Science, Schools, Perspectives, and Models of Psychology, Recent Trends
- II. **Biological Basis of Behaviour:** Nervous System, Neuron and its function, Central and Peripheral Nervous System, Endocrine System
- III. **Sensation and Perception:** Sensory process through sense organs, Perception, Gestalt Principles, Binocular and Monocular cues, Illusions and Extra Sensory Perception, Determinants of Perception
- IV. **Learning and Memory:** Nature and Forms of Learning, Types of learning: Classical and Operant Conditioning, Reinforcement, Extinction, Discrimination, Punishment, Observational Learning, Theories of Learning, Types of Memory, Process of Memory, Forgetting, Theories of Memory
- V. **Motivation and Emotion:** Homeostasis, Factors affecting Motivation, Biogenic and Social Motives, Measurement of Human Motivation, Theories of Motivation, Emotions, Types of Emotions, Physiological changes and Emotion, Theories of Emotion.
- VI. **Psychological Assessment:** Attributes of Psychological Measures, Validity, Reliability, Item Analysis, Norms, Modern Test Theory, Selection and Training, Educational and Clinical Assessment, Ethical Standards and Legal Issues

- VII. Personality:** Determinants of Personality, Factors in Development of Personality, Theoretical Perspectives, Traits and Types, Personality Assessment and Techniques, Cross-Cultural Issues.
- VIII. Intelligence:** Theories of Intelligence, Types of intelligence (IQ, EQ), Assessing Intelligence
- IX. Social Influence and Group Dynamics:** Social Facilitation, Attribution, Conformity, Obedience, Altruism, Attitudes, Social Norms.
- X. Developmental Psychology:** Physical, Cognitive, Social and Emotional development in Childhood, Adolescence, Adulthood and Old Age
- XI. Abnormal and Clinical Psychology:** Concept and causes of Abnormality, Clinical Assessment and Intervention, Different disorders such as Schizophrenia, Mood disorder, Anxiety disorder, Personality disorder, etc. Psychological treatment including different Therapeutic techniques.
- XII. Organizational/Industrial Psychology:** Leadership styles, Decision making, Work motivation, Organizational Culture, Stress and Conflict at Work and its Management, Organizational Socialization, Job related Attitude, Sexual Harassment, Glass Ceiling, Human Computer interaction.
- XIII. Health Psychology:** Beliefs and Behaviour, Models of Health Psychology, Assessment and Intervention, Models of Stress, Chronic and Terminal Illness, Role of Social Support.

SUGGESTED READINGS

S.No.	Title	Author
1.	Applied Industrial/Organizational Psychology	Aamodt, M.
2.	Introduction to Psychology	Atkinson R. C., & Smith, E. E
3.	Social Psychology	Baron, R. A
4.	Introduction to Psychology: Gateways to Mind and Behavior	Coon, D., & Mitterer, J.
5.	Development Across the Life Span	Feldman, R.
6.	Foundation of Psychology	Hayes, N
7.	Abnormal Psychology	Kring, A. M
8.	Psychology	Myers, D. G.
9.	Psychology: Concepts and Connections	Rathus, S.
10.	Organizational Psychology	Singh, P.

PAPER-II: PROFESSIONAL**Max Marks: 100****Time Allowed: 3 Hours**

Case No.	F.4-114 /2019-R
Particulars of post	Deputy Director (NGOs & Private Sector) (BS-18), Ministry of Climate Change.
Minimum Qualification & Experience:	<p>i. Second Class or Grade 'C' Master's Degree or equivalent in Social Work/ Sociology/ Anthropology/ Business Administration.</p> <p>ii. Five (5) years post qualification experience of work in a responsible position equivalent to gazetted scale in the field of Social Work/ Sociology/ Anthropology in dealing with NGOs/ Private Sector Social Work Organizations in Government/ Semi Government/ Reputable Private Organization.</p>

Part-I: 50 Marks

(Public Administration & Office Management)

- I. **Public Administration:** Nature and scope, Role of Public Administration in a modern Welfare State;
- II. **Bureaucracy:** Concept of Bureaucracy, Theories of Bureaucracy, Ecology of Bureaucracy; Bureaucracy of Pakistan as a Change Agent;
- III. **Administrative Leadership:** Approaches to the study of Leadership, Forms of Leadership, Leadership qualities;
- IV. **Administrative Accountability:** Internal and External Controls; Executive Control, Legislative Control, Judicial Control, Ombudsman, Public Opinion and Pressure Groups; Problems of Administrative Accountability in Pakistan;
- V. **Planning:** Types of Plans, Planning Process; Principles of Planning, Planning Machinery in Pakistan;
- VI. **Controlling and Co-Ordination:** Forms of Controls, Controls, Control Mechanism, the process of Control, Principles of Controlling; Principles of Coordination; Machinery for Coordination; Problems of Coordination in Public Administration in Pakistan.
- VII. Civil Servant Act 1973 and Rules made thereunder;
- VIII. Rules of Business 1973;
- IX. Secretariat Instructions and Office Procedures;
- X. PPRA Ordinance and Rules 2004.

Part-II: 50 Marks**(Sociology, Anthropology and Social Work)**

- I. **Community:** The rural community, Traditional Characteristics of rural life, The urban community, Rural – Urban convergence, Urbanism, Future of cities in Pakistan.
- II. **Social Institutions:** The nature and genesis of institutions, The process of institutionalization, Functions of Social Institutions: Family, Religion, Education, Economy and Politics.
- III. **Social Problems in Pakistan:** High population growth rate, Rural –urban migration. Issues of technical/vocational training, Deviance and street crime, Unemployment, illiteracy and School drop out, Smuggling, Prostitution, Poverty, Drug Addiction, Child Labour and Abuse, Bonded Labour, Social customs and Traditions affecting Women in Pakistan, Violence Against Women and Domestic Violence, Issues concerning the Elderly in Pakistan.

IV. Anthropological Theories

- Contributors: (Edward Burnett Taylor, Lewis Henry Morgan, James Frazer, Karl Marx, Edmund Leach, Franz Boas, Margaret Mead, Ruth Benedict, Alfred L. Kroeber, Alfred Reginald Radcliffe-Brown, Bronislaw Kasper Malinowski, Clifford Geertz, Talal Asad, Akbar S. Ahmad, Ibn Khaldun, Shah Waliullah)
- Classical Theories: (Degenerations, Evolutionism, Neo-Evolutionism, Diffusions)
- Modern Theories: (Functionalism, Structural-functionalism, Class struggle, Structuralism, Historical Particularism, Feminism, Culture and personality)
- Current Trends in Anthropological Thoughts: (Post Modernism, Romanticism, Poetics and Politics of Ethnography)

V. Anthropological Research Methods : Meaning, definition, types and aims of anthropological research, Qualitative and Quantitative research, Purpose of research, research question, variables, hypothesis, research objective(s), research design, sampling, field data collection, tools of data collection (questionnaire, interview, participant observation), data classification, data analysis, and reporting.

VI. Human Growth and Personality Development: Meaning and significance of human growth, Basic assumptions of human behaviour, Approaches to the study of human development, Principles of human development, Factors influence human growth/development , Phases of human development Levels of functioning of human mind and behaviour perspectives, Components of human personality, Theories of personality development, Concepts of abnormal behaviour, Role of Nature & Nurture in Personality Development

SUGGESTED READINGS

S. No.	Title	Author
1.	An Introduction to the Public Administration	E.N. Cladden
2.	Bureaucracy: Modern Society	Pebr, M. Blau.
3.	Public Administration for a Welfare State	Paul Ableby
4.	The Bureaucracy of Pakistan	Charles F. Kennedy
5.	Poverty Alleviation. Institute of Policy Studies. Islamabad.	Sahibzada, Mohibul Haq..
6.	Sociology : A down to earth approach	James M. Henslin
7.	Contemporary Sociological Theories	Pitrim Sorokin
8.	The Sociology of Rural Life	Lynn Smith, T.
9.	An Introduction to Theory in Anthropology	Robert Layton
10.	Anthropological Theory	John R. McGee and Richard L. Warms
11.	Anthropology and Development	Jean-Pierre Olivier de Sardan
12.	Human Development	Justin, P.
13.	The Field of Social Work	Fink, A. E.
14.	The Introduction to Human Development	Loveii, K
15.	Insights into Human Behavior	Fitch, S. K.

PAPER-II: PROFESSIONAL**Max Marks: 100****Time Allowed: 3 Hours**

Case No.	F.4-127-A/2019-R
Particulars of post	Associate Professor (Male) (English) (BS-19), Federal Government Educational Institutions (Cantt/ Garrison), Ministry of Defence
Minimum Qualification & Experience:	Ph.D. Degree in the relevant subject with eight (08) year post qualification teaching and administrative experience at College/ University level. OR M.Phil. Degree in the relevant subject with ten (10) years post qualification teaching and administrative experience at College/ University level. OR Second Class or Grade 'C' Master's Degree in the relevant subject with twelve (12) years post qualification teaching and administrative experience at College/ University level.

Part-I: (English)**50 Marks****I. Essays:**

- Bertrand Russell (The Conquest of Happiness)
- George Orwell (Politics and the English Language; The Prevention of Literature)
- Ralph Waldo Emerson (The Transcendentalist; Self-reliance)

II. Short Stories:

- Somerset Maugham (The Lotus-eater)
- G.K.Chesterton (A Somewhat Improbable Story)
- O'Henry (The Gift of the Magi)

III. Poetry:

- William Wordsworth (Resolution Independence; Tintern Abbey)
- John Keats (Ode to a Nightingale; Ode to Autumn)
- Lord Alfred Tennyson (Ulysses; The Lady of Shalott)
- Yeats (A Dialogue of Self and Soul; The Second Coming)
- Eliot (The Wasteland; Love Song of J. Alfred Prufrock)
- Philip Larkin (Maturity; Continuing to Live; The Trees)
- Wallace Stevens (A postcard from the volcano; Continual conversation with a silent man; Dry loaf) **OR** Walt Whitman (As I ponder'd in silence; Are you the new person drawn toward me?; This moment yearning and thoughtful)

IV. Drama:

- Shakespeare (*Hamlet; King Lear, As you like it and Twelfth Night*)
- William Congreve (*The Way of the World*)
- Shaw (*Pygmalion; Heartbreak House*)
- Harold Pinter (*The Caretaker*)
- Samuel Beckett (*Waiting for Godot*)
- Eugene O'Neill (*Long Day's Journey into Night*)

V. Novels:

- Thomas Hardy (*Far from the Madding Crowd*)
- D.H. Lawrence (*Sons and Lovers*)
- George Orwell (*Nineteen Eighty-four*)
- James Joyce (*A Portrait of the Artist as a Young Man*)
- Iris Murdoch (*Under the Net*)
- Nathaniel Hawthorne (*The Scarlet Letter*) or William Faulkner (*The Sound and the Fury*)

VI. Literacy Theory & Criticism

- Structuralism
- Marxism
- Deconstructionism
- Psychoanalytic criticism
- Feminist criticism
- Postcolonial Criticism

Part-II: (Professional)**50 Marks****I. Development of Curriculum and Instructional Material**

- Elements of Curriculum.
- Curriculum Development Process: Need Assessment, Formulation of Aims and Objectives, Taxonomies of Educational Objectives, Selection of Content, Development of Curricular Materials.

II. Process of Teaching and Teaching Strategies

- Process of Classroom Communication
- Factors affecting Classroom Communication
- Barriers to Classroom Communications
- Use of Instructional Materials and Media

III. Educational Assessment and Evaluation

- Concept of Classroom Assessment and Evaluation
- Distinction between Assessment, Evaluation and Measurement
- Approaches to Evaluation: Formative Evaluation; Summative Evaluation
- Types of Test: Essay Type; Objective Type: Multiple Choice, True-False Items, Matching Type; Principles of Construction of these Test
- Characteristics of a Good Test: Validity, Reliability, Objectivity, Usability

IV. Educational Administration and Supervision

- The Concept of Administration
- Educational Supervision

V. Research Methods in Education

- Scientific Method and its Application in Education
- Sampling Techniques:
- Research Instruments: Questionnaire: Interview; Test; Observation; Rating Scale
- Research Proposal and Report Writing

SUGGESTED READINGS

S.No.	Title	Author
1.	The basics Literary Theory. (Second edition). Routledge.	Bertens, H. (2008).
2.	Literary Theory: An Introduction. (Anniversary Edition).	Eagleton, E. (2008).
3.	A New Handbook of Literary Terms.	Mikics, W. (2007).
4.	A Companion to Twentieth Century Poetry.	Roberts, N. (2003).
5.	A Reader's Guide to Contemporary Literary Theory. (Fifth edition).	Selden, R., Widdowson, P., & Brooker, P. (2005)
6.	Twentieth Century British Drama.	Smart, J. (2001).
7.	Modern Critical Views & Interpretations, ed: 80's and 90's editions.	Harold Bloom (these include all range of authors and their works given above)
8.	A Companion to 20 th Century Drama Oxford: Blackwell.	Krasner David. 2005.
9.	Research in Education	JW Best
10.	Integrating Education Technology into Teaching	Roblyer
11.	Curriculum Development	S. M. Shahid
12.	Educational Measurement and Evaluation	S. M. Shahid
13.	Educational Administration	S. M. Shahid

PAPER-II: PROFESSIONAL

Max Marks: 100

Time Allowed: 3 Hours

Case No.	F.4-127-B/2019-R
Particulars of post	Associate Professor (Male) (Computer Science) (BS-19), F.G. Colleges, Federal Government Educational Institutions (Cantts/ Garrisons), Ministry of Defence
Minimum Qualification & Experience:	<p>Ph.D. Degree in the relevant subject with eight (08) year post qualification teaching and administrative experience at College/ University level.</p> <p style="text-align: center;">OR</p> <p>M.Phil. Degree in the relevant subject with ten (10) years post qualification teaching and administrative experience at College/ University level.</p> <p style="text-align: center;">OR</p> <p>Second Class or Grade 'C' Master's Degree in the relevant subject with twelve (12) years post qualification teaching and administrative experience at College/ University level.</p>

Part-I: (Computer Science)**50 Marks****I. Computer Architecture**

Microprocessor Bus Structure (Address/Data/Control), Registers and Flags, Storage Hierarchy (Main/Virtual/Cache/Secondary memory), Peripheral communication, CPU, ALU, Principles of Instruction Set Design, Multiprocessors & Thread Level Parallelism.

II. Object Oriented Programming

Data types, control structures, functions, arrays, classes, methods, object and encapsulation; constructors and destructors, operator and function overloading, virtual functions, derived classes, inheritance and polymorphism, I/O and file processing.

III. Data Structure and Algorithms

Stack and Queue, Sequential Search, Binary Search, Bubble sort, Merge sort, Quick sort, Insertion sort, Selection Sort, Linked Lists, Infix to postfix conversions, Expression tree construction, Tree traversals, Graph representation and traversal, Minimum spanning tree.

IV. Database Management Systems

Entity Relationship modeling, Relational data model and algebra, Structured Query language, Database design, functional dependencies and normal forms, concurrency control and recovery techniques, Database security and authorization.

V. Computer Communications and Networks

Asynchronous and Synchronous transmission, LAN/WAN/MAN, Network layers, Transport layer protocols TCP/IP, UDP, Error Control, Flow Control, Multiplexing, Routing, Bridging, Network security issues.

VI. Operating Systems

Process and CPU management, Multithreading, Deadlocks, Memory management and virtual memory, External Fragmentation, Paging and Demand Paging, File management systems, Scheduling and dispatch, Introduction to concurrency.

Part-II: (Professional) 50 Marks

I. Development of Curriculum and Instructional Material

- Elements of Curriculum.
- Curriculum Development Process: Need Assessment, Formulation of Aims and Objectives, Taxonomies of Educational Objectives, Selection of Content, Development of Curricular Materials.

II. Process of Teaching and Teaching Strategies

- Process of Classroom Communication
- Factors affecting Classroom Communication
- Barriers to Classroom Communications
- Use of Instructional Materials and Media

III. Educational Assessment and Evaluation

- Concept of Classroom Assessment and Evaluation
- Distinction between Assessment, Evaluation and Measurement
- Approaches to Evaluation: Formative Evaluation; Summative Evaluation
- Types of Test: Essay Type; Objective Type: Multiple Choice, True-False Items, Matching Type; Principles of Construction of these Test
- Characteristics of a Good Test: Validity, Reliability, Objectivity, Usability

IV. Educational Administration and Supervision

- The Concept of Administration
- Educational Supervision

V. Research Methods in Education

- Scientific Method and its Application in Education
- Sampling Techniques:
- Research Instruments: Questionnaire: Interview; Test; Observation; Rating Scale
- Research Proposal and Report Writing

Suggested Reading

S.No.	Title	Author
1.	Modern Operating Systems	Andrew S. Tanenbaum
2.	Operating System Concepts	Addison-Wesley
3.	Algorithms and Data Structures	N. Wirth
4.	Data structures	Aaron M. Tanenbaum,
5.	Database Systems: A Practical Approach to Design, Implementation and Management	R.Connolly and P.Begg
6.	Introduction to Computer Networks	A. S. Tanenbaum
7.	Computer Networks and Internets	Douglas E. Comer
8.	Computer Architecture: A Quantitative Approach	Hennessy & Patterson
9.	Research in Education	JW Best
10.	Integrating Education Technology into Teaching	Roblyer
11.	Curriculum Development	S.M. Shahid
12.	Educational Measurement and Evaluation	S.M. Shahid
13.	Educational Administration	S.M. Shahid

PAPER-II: PROFESSIONAL**Max Marks: 100****Time Allowed: 3 Hours**

Case No.	F.4-127-C/2019-R
Particulars of post	Associate Professor (Male) (Mathematics) (BS-19), F.G. Colleges, Federal Government Educational Institutions (Cantts/ Garrisons), Ministry of Defence
Minimum Qualification & Experience:	Ph.D. Degree in the relevant subject with eight (08) year post qualification teaching and administrative experience at College/ University level. OR M.Phil. Degree in the relevant subject with ten (10) years post qualification teaching and administrative experience at College/ University level. OR Second Class or Grade 'C' Master's Degree in the relevant subject with twelve (12) years post qualification teaching and administrative experience at College/ University level.

Part-I: (Mathematics)**50 Marks****I. Vector Calculus**

Vector algebra; scalar and vector products of vectors; gradient divergence and curl of a vector; line, surface and volume integrals; Green's, Stokes' and Gauss theorems.

II. Statics

Composition and resolution of forces; parallel forces and couples; equilibrium of a system of coplanar forces; centre of mass of a system of particles and rigid bodies; equilibrium of forces in three dimensions.

III. Dynamics

- Motion in a straight line with constant and variable acceleration; simple harmonic motion; conservative forces and principles of energy.
- Tangential, normal, radial and transverse components of velocity and acceleration; motion under central forces; planetary orbits; Kepler laws;

IV. Ordinary differential equations

- Equations of first order; separable equations, exact equations; first order linear equations; orthogonal trajectories; nonlinear equations reducible to linear equations, Bernoulli and Riccati equations.
- Equations with constant coefficients; homogeneous and inhomogeneous equations; Cauchy-Euler equations; variation of parameters.
- Ordinary and singular points of a differential equation; solution in series; Bessel and Legendre equations; properties of the Bessel functions and Legendre polynomials.

V. Fourier series and partial differential equations

- Trigonometric Fourier series; sine and cosine series; Bessel inequality; summation of infinite series; convergence of the Fourier series.
- Partial differential equations of first order; classification of partial differential equations of second order; boundary value problems; solution by the method of

separation of variables; problems associated with Laplace equation, wave equation and the heat equation in Cartesian coordinates.

VI. Numerical Methods

- Solution of nonlinear equations by bisection, secant and Newton-Raphson methods; the fixed- point iterative method; order of convergence of a method.
- Solution of a system of linear equations; diagonally dominant systems; the Jacobi and Gauss-Seidel methods.
- Numerical solution of an ordinary differential equation; Euler and modified Euler methods; Runge- Kutta methods.

Part-II: (Professional)

50 Marks

I. Development of Curriculum and Instructional Material

- Elements of Curriculum.
- Curriculum Development Process: Need Assessment, Formulation of Aims and Objectives, Taxonomies of Educational Objectives, Selection of Content, Development of Curricular Materials.

II. Process of Teaching and Teaching Strategies

- Process of Classroom Communication
- Factors affecting Classroom Communication
- Barriers to Classroom Communications
- Use of Instructional Materials and Media

III. Educational Assessment and Evaluation

- Concept of Classroom Assessment and Evaluation
- Distinction between Assessment, Evaluation and Measurement
- Approaches to Evaluation: Formative Evaluation; Summative Evaluation
- Types of Test: Essay Type; Objective Type: Multiple Choice, True-False Items, Matching Type; Principles of Construction of these Test
- Characteristics of a Good Test: Validity, Reliability, Objectivity, Usability

IV. Educational Administration and Supervision

- The Concept of Administration
- Educational Supervision

V. Research Methods in Education

- Scientific Method and its Application in Education
- Sampling Techniques:
- Research Instruments: Questionnaire: Interview; Test; Observation; Rating Scale
- Research Proposal and Report Writing

SUGGESTED READINGS

S. No.	Title	Author
1.	An Introduction to Vector Analysis	Khalid Latif,
2.	Introduction to Mechanics	Q.K. Ghorri
3.	An Intermediate Course in Theoretical Mechanics	Khalid Latif,
4.	Differential Equations with Boundary Value Problems	D. G. Zill and M. R. Cullen
5.	Elementary Differential Equations	E.D. Rainville, P.E. Bedient and R.E. Bedient

S. No.	Title	Author
6.	Elements of Numerical Analysis	F. Ahmad and M.A Rana
7.	Mathematical Methods	S. M. Yousaf, Abdul Majeed and Muhammad Amin
8.	Research in Education	JW Best
9.	Integrating Education Technology into Teaching	Roblyer
10.	Curriculum Development	S.M. Shahid
11.	Educational Measurement and Evaluation	S.M. Shahid
12.	Educational Administration	S.M. Shahid

PAPER-II: PROFESSIONAL**Max Marks: 100****Time Allowed: 3 Hours**

Case No.	F.4-127-D/2019-R
Particulars of post	Associate Professor (Male) (Biology) (BS-19), F.G. Colleges, Federal Government Educational Institutions (Cantts/ Garrisons), Ministry of Defence
Minimum Qualification & Experience:	<p>Ph.D. Degree in the relevant subject with eight (08) year post qualification teaching and administrative experience at College/ University level.</p> <p style="text-align: center;">OR</p> <p>M.Phil. Degree in the relevant subject with ten (10) years post qualification teaching and administrative experience at College/ University level.</p> <p style="text-align: center;">OR</p> <p>Second Class or Grade 'C' Master's Degree in the relevant subject with twelve (12) years post qualification teaching and administrative experience at College/ University level.</p>

Part-I: (Biology)**50 Marks****I. Anatomy and Embryology**

- Primary and secondary tissues. Meristems. Secondary growth in dicot stem. Anatomy of leaf, stem and root.
- Micro and megasporogenesis, pollination mechanism, fertilization, development of Embryo and Endosperm, Seed dispersal.

II. Plant Physiology

- Plant water relations, Osmotic Quantities, component potentials of water and their role in transport, water absorption by roots, transpiration. Role of essential mineral elements and their uptake. Plant hormones. Photoperiodism, Vernalization. Dormancy and Seed germination. Enzymes.
- Photosynthesis: Plant pigments, Light reaction, CO₂ fixation, Mechanism of photophosphorylation.
- Respiration: Glycolysis, Krebs cycle, Mechanism of oxidative phosphorylation.

III. Genetics & Evolution

- Mendelian Genetics, Multiple Alleles, Polygenic inheritance, Gene interaction, Epistasis and pleiotropy, Sex-linked inheritance, Chromosomal aberrations, Mutations, DNA repair.
- Introduction of Evolution, Evolutionary history, Evolution of life, Convergent Evolution, Divergent Evolution, Parallel Evolution and Natural selection

IV. Molecular Biology

- Nucleic acids, DNA as hereditary material, DNA replication, Transcription, Genetic code, Protein synthesis, Genetic engineering and its application, Genetically Modified Organisms (GMO).

V. Animal Form and Function

- Protection, Support and Movement: Integumentary system of invertebrates and vertebrates; Animal muscles: the muscular system of invertebrates and vertebrates.
- Digestion and Nutrition: Feeding mechanism, Digestion, Organization and regional function of alimentary canal, Regulation of food intake, Nutritional requirements
- Internal Fluids and Respiration: Internal fluid environment, Composition of blood, Circulation and respiration mechanisms
- Nervous Coordination: Nervous system and Senses: Functional units of nervous system, Synapses junctions between nerves.
- Chemical Coordination: Endocrine System; Vertebrate endocrine glands and types of hormones, Mechanism of hormones action,

Part-II: (Professional)

50 Marks

I. Development of Curriculum and Instructional Material

- Elements of Curriculum.
- Curriculum Development Process: Need Assessment, Formulation of Aims and Objectives, Taxonomies of Educational Objectives, Selection of Content, Development of Curricular Materials.

II. Process of Teaching and Teaching Strategies

- Process of Classroom Communication
- Factors affecting Classroom Communication
- Barriers to Classroom Communications
- Use of Instructional Materials and Media

III. Educational Assessment and Evaluation

- Concept of Classroom Assessment and Evaluation
- Distinction between Assessment, Evaluation and Measurement
- Approaches to Evaluation: Formative Evaluation; Summative Evaluation
- Types of Test: Essay Type; Objective Type: Multiple Choice, True-False Items, Matching Type; Principles of Construction of these Test
- Characteristics of a Good Test: Validity, Reliability, Objectivity, Usability

IV. Educational Administration and Supervision

- The Concept of Administration
- Educational Supervision

V. Research Methods in Education

- Scientific Method and its Application in Education
- Sampling Techniques:
- Research Instruments: Questionnaire; Interview; Test; Observation; Rating Scale
Research Proposal and Report Writing

SUGGESTED READINGS

S. No.	Title	Author
1.	Comparative Morphology of the Vascular Plants	Foster, A.S. and E.H. Gifford. 1989
2.	Genetics: A Conceptual Approach. 4 th edition	Pierce, B. A. 2012
3.	Molecular Cell Biology	Lodish,H., A. Berk, S.L. Zipursky, P. Matsudaira, D. Baltimore and J. Darnell 2000
4.	Ilmi Biomolecules, Cell Biology and Genetics.	Cheema, T.A. and Cheema Z.T. 2009
5.	Growth and Differentiation in Plants	Phillips and Wareings
6.	Animal behavior:- An Evolutionary Approach	John Alcock
7.	Biology	Campbell, N.A.
8.	Research in Education	JW Best
9.	Integrating Education Technology into Teaching	Roblyer
10.	Curriculum Development	S. M. Shahid
11.	Educational Measurement and Evaluation	S. M. Shahid
12.	Educational Administration	S. M. Shahid

PAPER-II: PROFESSIONAL**Max Marks: 100****Time Allowed: 3 Hours**

Case No.	F.4-127-E/2019-R
Particulars of post	Associate Professor (Male) (Chemistry) (BS-19), F.G. Colleges, Federal Government Educational Institutions (Cantts/ Garrisons), Ministry of Defence
Minimum Qualification & Experience:	Ph.D. Degree in the relevant subject with eight (08) year post qualification teaching and administrative experience at College/ University level. OR M.Phil. Degree in the relevant subject with ten (10) years post qualification teaching and administrative experience at College/ University level. OR Second Class or Grade 'C' Master's Degree in the relevant subject with twelve (12) years post qualification teaching and administrative experience at College/ University level.

Part-I: (Chemistry)**50 Marks**

- I. Atomic structure.—Quantum theory, Schrodinger equation, Particle in box, hydrogen atom. Hydrogen molecule ion, hydrogen molecule. Theories of hydrogen and metallic bonding.
- II. Electrochemistry.—Ionic equilibria, theory of strong electrolytes; Debye-Huckel theory of activity coefficients, galvanic cells, membrane equilibria and fuel cells. Theories of Acids and Bases, glass electrode, measurement of pH. Electrolysis, overvoltage and corrosion.
- III. Thermodynamics.—First law of thermodynamics, internal energy, enthalpy functions. Thermochemistry, Entropy and second law of Thermodynamics, Free energy and chemical equilibrium.
- IV. Chemistry of Following Elements.—Oxygen, Carbon, Chlorine, Silicon, Nitrogen, Phosphorus.
- V. Inorganic Chemical Industries.—Sulphuric Acid, Fixation of Nitrogen, Chemical Fertilizers, Semi-conductivity devices. Cement, Glass and Ceramics.
- VI. Chemical Kinetics.—Rate law and its determination Order of reaction. Experimental methods. Temperature Dependence of rate constants. Study of mechanism of a few selected reactions (1st and 2nd under reaction only).
- VII. Surface Chemistry and Catalysis.—Physical adsorption and chemisorption. Surface area determination. Homogeneous and Heterogeneous Catalysis. Acid-base and Enzyme Catalysis.
- VIII. Physical Organic Chemistry.—Elements of Organic reaction mechanism. Optical and Geometric Isomerism. Conformational analysis. Resonance. H—Bond and its effects on the properties of Organic Compounds.
- IX. Aromatic Chemistry.—Structure of Benzene with particular reference to Mechanism of Electrophilic Substitution Reactions.
- X. Chemistry of Natural Products.—Elementary study of Carbohydrates. Oils and Fats. Alkaloids and Vitamins.
- XI. Industrial Organic Chemistry.—Organic Polymers. Fermentation processes including preparation of Anti-Biotics. Petro-Chemical Industry.

Part-II: (Professional) 50 Marks

- I. Development of Curriculum and Instructional Material**
- Elements of Curriculum.
 - Curriculum Development Process: Need Assessment, Formulation of Aims and Objectives, Taxonomies of Educational Objectives, Selection of Content, Development of Curricular Materials.
- II. Process of Teaching and Teaching Strategies**
- Process of Classroom Communication
 - Factors affecting Classroom Communication
 - Barriers to Classroom Communications
 - Use of Instructional Materials and Media
- III. Educational Assessment and Evaluation**
- Concept of Classroom Assessment and Evaluation
 - Distinction between Assessment, Evaluation and Measurement
 - Approaches to Evaluation: Formative Evaluation; Summative Evaluation
 - Types of Test: Essay Type; Objective Type: Multiple Choice, True-False Items, Matching Type; Principles of Construction of these Test
 - Characteristics of a Good Test: Validity, Reliability, Objectivity, Usability
- IV. Educational Administration and Supervision**
- The Concept of Administration
 - Educational Supervision
- V. Research Methods in Education**
- Scientific Method and its Application in Education
 - Sampling Techniques:
 - Research Instruments: Questionnaire: Interview; Test; Observation; Rating Scale
 - Research Proposal and Report Writing

SUGGESTED READINGS

S. No.	Title	Author
1.	Advanced Inorganic Chemistry 3 rd Ed.	Cotton. F.A. and Wilkinson Groffrey
2.	Inorganic Chemistry, 3 rd Ed. 1983	Hukeavy, James E.
3.	Physical Chemistry 5 th Ed.	Moore, Walter J.
4.	Mechanism & Structure in Organic Chemistry	Gould, Edwards
5.	Organic Chemistry 2 nd Ed.	Morrison, Robert Thornton & Boyd R.N.
6.	Research in Education	JW Best
7.	Integrating Education Technology into Teaching	Roblyer
8.	Curriculum Development	S. M. Shahid
9.	Educational Measurement and Evaluation	S. M. Shahid
10.	Educational Administration	S. M. Shahid

PAPER-II: PROFESSIONAL**Max Marks: 100****Time Allowed: 3 Hours**

Case No.	F.4-130 /2019-R
Particulars of post	Deputy Director (Urdu Stenography) (BS-18), Secretariat Training Institute, Islamabad, Establishment Division.
Minimum Qualification & Experience:	<ul style="list-style-type: none"> i. Second Class or Grade 'C' Bachelor's degree with Urdu as one of the subject from University recognized by HEC. ii. Minimum shorthand speed: 100 w.p.m. and typing speed: 40 w.p.m. with 90% accuracy iii. Certificate in Urdu Stenography from a recognized Institution. iv. Ten (10) years post qualification functional/ instructional experience of Urdu Stenography.

Professional Test : 100 Marks

S. No.	Detail of Topics	Marks
1.	Urdu Typing Test on Inpage with minimum speed of 40 w.p.m with 90% Accuracy	35
2.	Urdu Shorthand Test with minimum speed of 100 w.p.m	35
3.	Computer Literacy Test: (30 Marks)	
	i. In-page (Typing, Formatting)	10
	ii. Microsoft Excel (Typing, Calculation and Graphic)	10
	iii. Microsoft Power Point (Typing, Formatting, Inserting Objects)	10