

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. 07/2016**

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications for Posts	Test Specification	Topics of Syllabi
1.	175/2016	Administrative Officer (BS-17), Institute of Optronics, Ministry of Defence Production	i. Second Class or Grade 'C' Master's or equivalent qualification from a University recognized by the HEC.. ii. Two (2) years post qualification experience in Admin and Finance.	Objective Type Test (MCQ) <u>Part-I</u> English =20 marks <u>Part-II</u> Professional Test=80 marks	<u>Part-I</u> Vocabulary, Grammar Usage, Sentence Structuring <u>Part-II</u> <ul style="list-style-type: none"> • Financial Management, • Rules of Business (Revised Edition-2007) • Secretariat Instructions & Office Procedure • General Financial Rules (Vol-I & II) • Civil Servants Act, 1973 and Rules made thereunder • Government Servant (Efficiency & Discipline) Rules, 1973 • Public Procurement Rules, 2004
2.	176/2016	Chemist (BS-17), Geological Survey of Pakistan, Ministry of Petroleum and Natural Resources.	Second Class or Grade 'C' M.Sc. degree in Chemistry with specialization in Analytical/ Inorganic/ Physical or Geo-Chemistry from a university recognized by HEC.	Objective Type Test (MCQ) <u>Part-I</u> English = 20 marks <u>Part-II</u> Professional Test = 80 marks	<u>Part-I</u> Vocabulary, Grammar Usage, Sentence Structuring <u>Part-II</u> <ul style="list-style-type: none"> • Basic concept of Analytical Chemistry. • Chemical Analysis of Water • Theory, Technique and Calculation of Volumetric and Gravimetric Analysis. • Coal Analysis particularly Analysis of Proximate and Ultimate • Theory, Principals, uses and working of Atomic Absorption Spectrophotometer and Flame Photometer • Oxidation-Reduction Titration • Decomposition Techniques of Rock and Minerals • Method of maintaining accuracy/precision in Chemical Analysis

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications for Posts	Test Specification	Topics of Syllabi
3.	177/2016	Drilling Engineer (BS-17), Geological Survey of Pakistan, Ministry of Petroleum and Natural Resources.	Second Class or Grade 'C' B.E/ B.Sc. degree in Mechanical Engineering or equivalent from a University recognized by the HEC.	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"> • Drilling and its Scope • Purpose and uses of Drilling • Classification of Drilling • Type of Drilling • Methods used for Purification of Drilling Fluid • Causes of Circulation Fluid losses and its Prevention • Function of Equipments and Accessories used for Drilling • Types of Mud used for Drilling • Types of Drilling Bits and their functions • Drilling Circulation Fluid: Type, Purpose and Properties.
4.	178/2016	Programmer (BS-17), Pakistan Post Office, Ministry of Communication	Second Class or Grade 'C' Master's Degree in Computer Science OR Second Class or Grade 'C' Master's Degree in Mathematics/ Statistics/ Physics/ Economics with two (2) years post qualification experience in Programme writing and training in Computer Programming	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"> • Object Oriented Programming • Data Structure • Database Management System • Operating Systems • Network, Network Architecture and Topologies • Software Engineering • Internet and Web Applications
5.	180/2016	Research Officer (BS-17), Food & Agriculture Section, Ministry of Planning, Development and Reform.	Second Class or Grade 'C' Master's Degree or equivalent qualifications in Agriculture Economics OR Bachelor's Degree or equivalent qualifications in Agriculture, Forestry, Veterinary Science, Animal Husbandry, Agricultural Engineering.	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"> • Concept of Integrated Agriculture • Challenges in Pakistan's Agriculture • Elements of Climate and their Relationship with Crop Growth • Genetic Improvement for Crop Production. • Horticulture • Rainfed and Irrigated Agriculture • Forest, Rangelands and Wildlife Importance and Significance • Range Management and Utilization • Forestry, Agro-forestry, Social Forestry and Forest Biometrics • Socio-economic and Ecological Impact of man made Forests

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications for Posts	Test Specification	Topics of Syllabi
6.	181/2016	Research Officer (BS-17), National Fertilizer Development Centre, Ministry of Planning, Development and Reform.	Second Class or Grade 'C' Master's Degree or equivalent qualifications in Agriculture Economics OR Second Class or Grade 'C' Bachelor's Degree or equivalent qualifications in Agriculture, Forestry, Veterinary Science, Animal Husbandry, Agricultural Engineering.	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"> • Concept of Integrated Agriculture • Challenges in Pakistan's Agriculture • Elements of Climate and their Relationship with Crop Growth • Genetic Improvement for Crop Production. • Horticulture • Rainfed and Irrigated Agriculture • Forest, Rangelands and Wildlife Importance and Significance • Range Management and Utilization • Forestry, Agro-forestry, Social Forestry and Forest Biometrics • Socio-economic and Ecological Impact of man made Forests
7.	182/2016	Assistant Private Secretary (BS-16 plus special pay @20% as per Government Policy), in a Government Organization	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.	<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 	50 Marks 50 Marks
8.	185/2016	Assistant Private Secretary (BS-16), Pakistan Mint Lahore, Finance Division	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.	<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 	50 Marks 50 Marks

**Schemes and Syllabi for Written Examination (Descriptive)
for All Posts in BS-18 & BS-19 included in Consolidated
Advertisement No. 07/2016**

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 précis writing and suggesting an appropriate title.

Reading Comprehension (10 marks)

A selected passage, 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: PROFESSIONALMax Marks: 100Time Allowed: 3 Hours

Case No.	F.4-166/2016-R
Particulars of post	Associate Professor (Mathematics) (BS-19), Federal College of Education, Capital Administration and Development Division
Minimum Qualification & Experience:	Second Class or Grade 'C' Master's Degree in Mathematics with twelve (12) years post qualification teaching/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.
- Relationship of Education and 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 Communication
- 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 Planning and Organization in Pakistan
- Approaches to Educational Administration: Democratic; Authoritarian; Laissez-faire
- Educational Supervision

V. Research Methods in Education

- Scientific Method and its Application in Education
- Sampling Techniques
- Research Instruments: Questionnaire; Interview; Test; Observation; Rating Scale
- Type of Research: Basic/Applied Research; Historical Research; Descriptive Research; Correlation Research; Causal-Comparative Research; Experimental Research; Action Research; Qualitative and Quantitative Research
- 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. Ghori
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
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.4-169/2016-R
Particulars of post	Assistant Chief (Fuel) (BS-18), Energy Appraisal & Plan Formulation Section, Energy Wing, Ministry of Planning, Development and Reform.
Minimum Qualification & Experience:	<p>i. Second Class or Grade 'C' Master's Degree or equivalent qualification in Petroleum Geology or Geology with specialization in Coal Resources.</p> <p style="text-align: center;">OR</p> <p>Bachelor's Degree of Engineering or equivalent qualifications in Petroleum, Gas Reservoir, Chemical, Energy, or Mining Engineering with specialization in Coal mining/technology.</p> <p>ii. Three (3) years post qualification experience in exploration of fuel and energy resources and/or production planning and designing in this field.</p>

Part-I: (Research and Planning)**50 Marks****i. Communication Skills, Technical Writing and Presentation Skills**

Paragraph writing, Essay writing, CV and job application, Translation skills, Study skills, Academic skills, Essay writing, Academic writing, Technical Report writing, Progress report writing, Presentation skills

ii. Planning and Management**a) Project Management**

Project Management. Processes Integration Management, Project Plan Development, Project Plan Execution and Overall Change Control.

b) Scope Management

Initiation, Scope Planning, Scope Definition, Scope Verification and Scope Change Control.

c) Time Management

Activity Definition, Activity Sequencing, Activity Duration Estimation, Schedule Development and Schedule Control.

d) Cost Management

Quality Planning, Staff Acquisition and Team Development.

e) Communications Management

Communications Planning, Information Distribution, Performance Reporting and Administrative Closure.

f) Risk Management

Risk Identification, Risk Quantification, Risk Response Development and Risk Response Control.

g) Procurement Management

Procurement Planning, Solicitation Planning, Solicitation, Source Selection, Contract Administration and Contract Close-Out.

h) Closing

Administrative Closure, Contract Close-Out and Lessons Learnt.

i) Lab Work

Computing Project Management Software, PERT, Gantt Chart/ Network, CPM, etc.

j) Statistical Techniques

All statistical techniques related to Planning & Research

Part-II: (Exploration of Fuel and Energy)**50 Marks****i. Petroleum Geology & Exploration**

Geological history of Petroleum. The origin, migration and accumulation of petroleum, Reservoirs with abnormal pressure and temperature. Geological distribution of petroleum in the world. Geological basins of Pakistan. Geology of existing oil and gas fields in Pakistan. Surface geological methods for petroleum exploration. Use of topography and surface features for oil prospecting. Geophysical exploration methods with emphasis on seismic methods. History of exploration in Pakistan.

ii. Coal Geology

Definition, composition, classification and origin of coal. Lithotypes and coal macerals. Chemical and petrographical analysis. Application of coal petrography. Depositional environments of coal and coal bearing strata, coalification process, types of coal basins and their tectonic setting, concepts of cyclic deposition in coal basin, origin of splits and partings in coal seams. Comparison between modern and ancient coal forming environments, structural problems relevant to exploration & mining. Coal utilization and resource evaluation. Coal bearing sequences of Pakistan. Methods of coal exploration: geological, geophysical and drilling. Coal mining and its environmental issues.

SUGGESTED READINGS

S. No.	Title	Author
1.	Practical English Grammar	A.J. Thomson and A.V. Martinet.
2.	Writing. Intermediate	Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet.
3.	Writing. Upper-Intermediate	Rob Nolasco.
4.	Reading. Advanced	Brian Tomlinson and Rod Ellis.
5.	Study Skills	Riachard Yorkey
6.	Writing. Advanced	Ron White.
7.	College Writing Skills	John Langan.
8.	Patterns of College Writing	Laurie G. Kirsznner and Stephen R. Mandell.
9.	The Mercury Reader. A Custom Publication.	Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharon.
10.	Project Management Body of Knowledge,	Project Management Institute (PMI) standards committee
11.	Software Project Management	S.A. Kelkar, A Concise Study, Prentice Hall of India.
12.	Geology of Petroleum	A. I. Levorsen.
13.	Basic Petroleum Geology	Peter K. Link.
14.	Petroleum Geology of Pakistan	Iqbal B. Kadri.
15.	Geophysical Prospecting	Milton, B. Dobrin.
16.	Basic Exploration Geophysics	Robinson
17.	Significance of Coal Resources of Pakistan	Kazmi
18.	Sedimentology of Coal and Coal Bearing Sequences	Rehmani & Flores

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

Case No.	F.4-172/2016-R
Particulars of post	Deputy Director (Research and Investigation (BS-18), Pakistan Environmental Protection Agency (PAK-EPA), Ministry of Climate Change
Minimum Qualification & Experience:	i. Second Class or Grade 'C' M.Sc. in Biology/ Chemistry/ Bio-Chemistry/ Chemical Technology ii. Five (5) years post qualification experience in BS-16 or above or equivalent in Research and Investigation including Planning/ Coordination in Govt./Semi Govt./ Reputable Organization.

Part-I: (Research and Planning)**50 Marks****i. Communication Skills, Technical Writing and Presentation Skills**

Paragraph writing, Essay writing, CV and job application, Translation skills, Study skills, Academic skills, Essay writing, Academic writing, Technical Report writing, Progress report writing, Presentation skills

ii. Planning and Management**a) Project Management**

Project Management. Processes Integration Management, Project Plan Development, Project Plan Execution and Overall Change Control.

b) Scope Management

Initiation, Scope Planning, Scope Definition, Scope Verification and Scope Change Control.

c) Time Management

Activity Definition, Activity Sequencing, Activity Duration Estimation, Schedule Development and Schedule Control.

d) Cost Management

Quality Planning, Staff Acquisition and Team Development.

e) Communications Management

Communications Planning, Information Distribution, Performance Reporting and Administrative Closure.

f) Risk Management

Risk Identification, Risk Quantification, Risk Response Development and Risk Response Control.

g) Procurement Management

Procurement Planning, Solicitation Planning, Solicitation, Source Selection, Contract Administration and Contract Close-Out.

h) Closing

Administrative Closure, Contract Close-Out and Lessons Learnt.

i) Lab Work

Computing Project Management Software, PERT, Gantt Chart/ Network, CPM, etc.

j) Statistical Techniques

All statistical techniques related to Planning & Research

Part-II: 50 Marks

(Human Resource, Financial Management,
Quality Management and Information Technology)

I. Human Resource and Financial Management:

Definition, Significance and Scope of Human Resource Management; Organization—Types of Organization, Theory of Organization, Principles of Organization, Organization of the Federal and Provincial Governments, Public Sector Enterprises; Approaches to Human Resource Management. Personnel Administration—Tools of Personnel Management: Selection, Training, Promotion, Compensation, Discipline; Communication, Communication Channels and Principles of Public Relations; Human Behaviour and Organizations Administration.—Elements of Financial Administration, Performance Programmed Budgeting, Capital Budget, Principles of Budgeting, Auditing and Accounting.

II. Basic Concept of Quality Management:

ISO-9000, ISO-13000, other certifications regarding quality measurement; management, management for Results, Setting Performance Goals and Targets; Job Analysis: Job Description, Job Specification, Performance Evaluation;

III. Information Technology and MS Office:

Fundamentals of Computer: CPU, Memory Devices, Types of Computers, Characteristics of Computer and related material; Application Software: Microsoft Word, Microsoft Power Point, Microsoft Excel; Search Engines, Web Design, Email, Internet Surfing, Social Networking (Facebook, Twitter, etc); General Introduction to Virus and Antivirus utilities; Programming Languages

SUGGESTED READINGS

S. No.	Title	Author
1.	Practical English Grammar	A.J. Thomson and A.V. Martinet.
2.	Writing. Intermediate	Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet.
3.	Writing. Upper-Intermediate	Rob Nolasco.
4.	Reading. Advanced	Brian Tomlinson and Rod Ellis.
5.	Study Skills	Riachard Yorkey
6.	Writing. Advanced	Ron White.
7.	College Writing Skills	John Langan.
8.	Patterns of College Writing	Laurie G. Kirsznner and Stephen R. Mandell.
9.	The Mercury Reader. A Custom Publication.	Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton.
10.	Project Management Body of Knowledge,	Project Management Institute (PMI) standards committee
11.	Software Project Management	S.A. Kelkar, A Concise Study, Prentice Hall of India.
12.	Human Resource Management	H.T.Graham & Roger Bennett
13.	Management	James A.F. Stoner, R.Eward Freeman, Daniel R. Gilbert Jr.
14.	Understanding Computer: Today and Tomorrow	Deborah Morley, Charles Parker
15.	MS Office 365 Handbook: 2013 Edition	Kevin Wilson

PAPER-II: PROFESSIONAL

Max Marks: 100

Time Allowed: 3 Hours

Case No.	F.4-174/2016-R
Particulars of post	Assistant Professor Chemistry (Male) (BS-18), Islamabad Model Colleges for Boys, Federal Directorate of Education Islamabad, Capital Administration and Development Division
Minimum Qualification & Experience:	Ph.D. Degree in the relevant subject with one (1) year post qualification teaching experience at College/ University level. OR M. Phil Degree in the relevant subject with three (3) years post qualification teaching experience at College/ University level. OR Second Class or Grade 'C' Master's Degree in the relevant subject with five (5) years post qualification teaching 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; ebye-Huckel theory of activity coefficients, galvanic cells, memberane 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, enthalphy 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 Hetrogeneous Catalysis. Acid-base and Enzyme Catalysis.
- VIII. Physical Organic Chemistry.—Elements of Organic reaction mechanism. Optical and Geometric Isomarism. 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.
- Relationship of Education and 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 Communication
- 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 Planning and Organization in Pakistan
- Approaches to Educational Administration: Democratic; Authoritarian; Laissez-faire
- Educational Supervision

V. Research Methods in Education

- Scientific Method and its Application in Education
- Sampling Techniques
- Research Instruments: Questionnaire; Interview; Test; Observation; Rating Scale
- Type of Research: Basic/Applied Research; Historical Research; Descriptive Research; Correlation Research; Causal-Comparative Research; Experimental Research; Action Research; Qualitative and Quantitative Research
- 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.4-179/2016-R
Particulars of post	Executive Engineer (Civil) (BS-18), Pakistan Post Office, Ministry of Communication
Minimum Qualification & Experience:	i. Bachelor's Degree or equivalent qualification in Civil Engineering from a recognized University. ii. At least Five (5) years post qualification in the relevant field in a responsible position.

Engineering 100 Marks**I. Civil Engineering Fundamentals:**

Building material & Building Construction, Surveying & Levelling, Hydraulic & Hydrology, Soil Mechanics & Foundation, Concrete Technology & R.C.C Structure Design, Irrigation, Steel Structure, Construction Management, Structural Design Applications, Dam Designing and Construction, Engineering Materials, Reinforced Concrete, Ground Improvement, Earth and Rock Structure

II. Public Health Engineering:

Environmental impacts on water resources projects, waste water treatment and management, water supply and distribution.

III. Costing, Accounting and Budgeting:

Net present value, Net future value, cash flows, auditing, income statement, balance sheet, taxation, financial risk management, cost analysis.

IV. Project Management:

Time lines, milestones, resources allocation, dependency, Gantt Charts,

V. Inventory Management:

FIFO models, LIFO models, Identification Schemes, Inventory management systems.

VI. Quality Management Systems:

QA models. Deming, Juran Crosby, Quality circles, management responsibility, quality planning, purchasing, design process and design validation, quality audit, corrective and preventive measures.

SUGGESTED READINGS

S.No.	Title	Author
1.	A handbook of Civil Engineering	P. N. Khanna
2.	Properties of Concrete	A.M. Neville.
3.	Plain and reinforced concrete	Nilson.
4.	Strength of material	Andrew Pytel and Singer.
5.	Civil Engineer's Reference Book	LS Blake
6.	Surveying and Leveling	T.P Kanetaker.
7.	Public Health Engineering	STEEL.
8.	Handbook of Engineering Management	Dennis Lock.
9.	Total Quality Management	Dale H. Besterfield, Carol Besterfield-Michna, Glen H. Besterfield, Mary Gesterfield-Sacre

PAPER-II: PROFESSIONAL

Max Marks: 100

Time Allowed: 3 Hours

Case No.	F.4-184-A/2016-R
Particulars of post	Assistant Professor (Mass Communication) (Female) (BS-18), Islamabad Model Colleges for Girls, Federal Directorate of Education Islamabad, Capital Administration and Development Division
Minimum Qualification & Experience:	Ph.D. Degree in the relevant subject with one (1) year post qualification teaching experience at College/ University level. OR M. Phil Degree in the relevant subject with three (3) years post qualification teaching experience at College/ University level. OR Second Class or Grade 'C' Master's Degree in the relevant subject with five (5) years post qualification teaching experience at College/ University level.

Part-I: (Mass Communication)**50 Marks****I. Basic models in Mass Communication: -**

Lasswell's Model (1948), Shannon-Weaver model (1948), Osgood,s model (1954), Schramm's model (1954), Newcomb's symmetry theory (1953), Westley-McLean's model (1976), Gerbner model (1956)

II. Mass Communication Theories

Normative theories of the press: Schramm's four theories and criticism on these theories, Media as agents of power, The Spiral of silence, Media Usage and gratifications, Media hegemony, Diffusion of innovations, Powerful effects model: hypodermic needle, magic bullet theory., Moderate effects model: two-step and multi-step flow of communication, Powerful media revisited: Marshal McLuhan's media determinism

III. Media and Society

Mass media and social change, Media as a social system: The balance between interrelation and interdependence, Media freedom and its role for democracy, The functional approach to mass media: four social functions of the media, Media as an awareness agent, Mass media and social representation

IV. Mass Media in Pakistan:

Media system in Pakistan: historical, chronological, and analytical review, The system of journalism and the media system, Employer-employee relations in Pakistani media, Government-press relations, Press in Pakistan: The newspaper industry, from mission to the market, Electronic media: from total dependence to enormous power, The new 24/7 television: uses and abuses, The new radio: potential for change and the present performance, The question of freedom and responsibility

V. Media Laws and Ethics:

Development of media regulations from British colonial era to independent Pakistan, Libel, Defamation and relevant portions of PPC, PPO, RPPPO, PEMRA:

establishment, development, and operational mechanisms, Press Council of Pakistan (PCP), Citizens Media Commission: need, present status, and reasons for inactivity, Press Code of Ethics, Inability of the media to develop a code of ethics as an institution, The media's quest for freedom and its inability to self regulate.

Part-II: (Professional) 50 Marks

I. Development of Curriculum and Instructional Material

- Elements of Curriculum.
- Relationship of Education and 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 Communication
- 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 Planning and Organization in Pakistan
- Approaches to Educational Administration: Democratic; Authoritarian; Laissez-faire
- Educational Supervision

V. Research Methods in Education

- Scientific Method and its Application in Education
- Sampling Techniques
- Research Instruments: Questionnaire; Interview; Test; Observation; Rating Scale
- Type of Research: Basic/Applied Research; Historical Research; Descriptive Research; Correlation Research; Causal-Comparative Research; Experimental Research; Action Research; Qualitative and Quantitative Research
- Research Proposal and Report Writing

SUGGESTED READINGS

S. No.	Title	Author
1.	Communication Models for The Study of Mass Communication, 2 nd Ed	McQuail, Dennis & Windhal, Swen, Longman, 1982.
2.	Communication Theories: Origins, Methods and Uses in the Mass Media 5 th Ed	Werner J. Severin, James W. Tankard Jr. Longman, 1997.
3.	Ethics in Journalism: A Reader on Their Perception in the Third World	Kunczik, Michael (Ed.). FES 1999.
4.	Media And Society into the 21 st Century: A Historical Introduction	Blackwell publishing Ltd, USA.
5.	“Media Now: Communication Media in the Information Age”	Wads Worth/Thompson Learning, Belmont, CA
6.	News Media and Journalism in Pakistan	Khan, Altaf. LAP Lambert Academic Publishing. June 2011.
7.	News Media and Journalism in Pakistan and Germany (Ed.)	Khan, Altaf. Peshawar, 2003.
8.	Political Communication in Asia,	Roultag, NY.
9.	Principles of Editing	McGraw-Hill 1996
10.	The Hand Book of New Media	London: Sage
11.	Telecommunications Policy in Pakistan”	Telematics and Informatics
12.	“Model Freedom of Information Act”, 2001	Consumer rights Protection Commission of Pakistan
13.	Research in Education	JW Best
14.	Integrating Education Technology into Teaching	Roblyer
15.	Curriculum Development	S.M. Shahid
16.	Educational Measurement and Evaluation	S.M. Shahid
17.	Educational Administration	S.M. Shahid

PAPER-II: PROFESSIONAL

Max Marks: 100

Time Allowed: 3 Hours

Case No.	F.4-184-B/2016-R
Particulars of post	Assistant Professor (History) (Female) (BS-18), Islamabad Model Colleges for Girls, Federal Directorate of Education Islamabad, Capital Administration and Development Division
Minimum Qualification & Experience:	Ph.D. Degree in the relevant subject with one (1) year post qualification teaching experience at College/ University level. OR M. Phil Degree in the relevant subject with three (3) years post qualification teaching experience at College/ University level. OR Second Class or Grade 'C' Master's Degree in the relevant subject with five (5) years post qualification teaching experience at College/ University level.

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

- I. **Muslim Rule and Heritage in India (712-1857):** Political History Arrival, foundation and consolidation of Muslim rule in India, important rulers of the Slave Dynasty and the Mughals. The Spirit and legacy of Muslim civilization, Art, Architecture and literature, Public Administration under Muslim Rules. Sultans, Kings, Economic, Social, Judicial, Civil and Military system during the Muslim rule, Industry, trade and commerce under the Muslim patronage, Financial Administration.
- II. **British Rule in India: 1857-1947:** British Imperialism, origin and growth of the East India Company, Causes and effects of downfall of the Mughal Empire in India, War of Independence in 1857: Causes and effects.
- III. **Muslim Struggle for Independence:** Role of Shah Wali Ullah, Syed Ahmad Shaheed and Sir Syed Ahmed Khan towards regeneration of the Muslim of South Asia, All India Muslim League, Partition of Bengal, Simla Deputation, Lucknow pact; Khilafat movement. Nahru Report, Quaid-i- Azam's Fourteen Points.
- IV. **Pakistan Movement:** Allama Iqbal's Allahabad Address 1930, and Round Table Conference. The Congress Rule in the provinces-1937-1939, Lahore Resolution 1940, various Missions and Plans for the partition of the South Asia. Founders of Pakistan: Quaid-i-Azam, Mohsin-ul-Mulk, Syed Amir Ali, Ali Brothers. Sir Agha Khan, Ch. Khaliq uz Zaman, Chaudhry Rahmat Ali, etc.
- V. **Separation of East Pakistan:** Causes and Effects.
- VI. **Working of Democracy in Pakistan:** Liaquat Ali Khan to Feroz Khan Noon (1947-1958), Zulfikar Ali Bhutto's Period,(1971-1977), Benazir, Nawaz Sharif, Revival of Democracy: 1988-1999, Restoration of Democracy (2008 to date), Role of Major Political Parties and Pressure Groups in the history of Pakistan.

Part-II: (Professional)**50 Marks**

- I. **Development of Curriculum and Instructional Material**
 - Elements of Curriculum.
 - Relationship of Education and 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 Communication
- 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 Planning and Organization in Pakistan
- Approaches to Educational Administration: Democratic; Authoritarian; Laissez-faire
- Educational Supervision

V. Research Methods in Education

- Scientific Method and its Application in Education
- Sampling Techniques
- Research Instruments: Questionnaire; Interview; Test; Observation; Rating Scale
- Type of Research: Basic/Applied Research; Historical Research; Descriptive Research; Correlation Research; Causal-Comparative Research; Experimental Research; Action Research; Qualitative and Quantitative Research
- Research Proposal and Report Writing

SUGGESTED READINGS

S. No.	Title	Author
1.	India's Struggle for Independence	Chandre Bipin, 1989
2.	Wavell and the Days of the Raj: Britain's Penultimate Viceroy in India,	Chawla, Muhammad Iqbal, 2011
3.	The Charismatic Leader: Jinnah and the Creation of Pakistan	Hayat, Sikandar, 2007
4.	Muslim Civilization of Indo-Pakistan.	Ikram, Shaikh Muhammad, 1966
5.	A History of Muslim Philosophy	Sharif, M.M.
6.	The History of Islamic Peoples	Brockelmann, Carl (ed)
7.	Constitutional and Political History of Pakistan	Khan, Hamid, 2005
8.	The Military and Politics in Pakistan 1947-86	Rizvi Hassan Askari
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: PROFESSIONALMax Marks: 100Time Allowed: 3 Hours

Case No.	F.4-184-C/2016-R
Particulars of post	Assistant Professor (Applied Psychology) (Female) (BS-18), Islamabad Model Colleges for Girls, Federal Directorate of Education Islamabad, Capital Administration and Development Division
Minimum Qualification & Experience:	Ph.D. Degree in the relevant subject with one (1) year post qualification teaching experience at College/ University level. OR M. Phil Degree in the relevant subject with three (3) years post qualification teaching experience at College/ University level. OR Second Class or Grade 'C' Master's Degree in the relevant subject with five (5) years post qualification teaching experience at College/ University level.

Part-I: (Applied Psychology)**50 Marks**

- I. **Nature and Scope of Psychology:** Definition and scope, Psychology as a Science, Schools, Perspectives, and Models of Psychology, Recent Trends
- II. **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
- III. **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.
- IV. **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
- V. **Personality:** Determinants of Personality, Factors in Development of Personality, Theoretical Perspectives, Traits and Types, Personality Assessment and Techniques, Cross-Cultural Issues.
- VI. **Intelligence:** Theories of Intelligence, Types of intelligence (IQ, EQ), Assessing Intelligence
- VII. **Developmental Psychology:** Physical, Cognitive, Social and Emotional development in Childhood, Adolescence, Adulthood and Old Age
- VIII. **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.

- IX. 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.
- X. Health Psychology:** Beliefs and Behaviour, Models of Health Psychology, Assessment and Intervention, Models of Stress, Chronic and Terminal Illness, Role of Social Support.

Part-II: (Professional)

50 Marks

I. Development of Curriculum and Instructional Material

- Elements of Curriculum.
- Relationship of Education and 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
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- Barriers to Classroom Communication
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- 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 Planning and Organization in Pakistan
- Approaches to Educational Administration: Democratic; Authoritarian; Laissez-faire
- Educational Supervision

V. Research Methods in Education

- Scientific Method and its Application in Education
- Sampling Techniques
- Research Instruments: Questionnaire; Interview; Test; Observation; Rating Scale
- Type of Research: Basic/Applied Research; Historical Research; Descriptive Research; Correlation Research; Causal-Comparative Research; Experimental Research; Action Research; Qualitative and Quantitative Research
- Research Proposal and Report Writing

SUGGESTED READINGS

S. No.	Title	Author
1.	Applied Industrial/Organizational Psychology	Aamodt, M.
2.	Introduction to Psychology	Atkinson R. C., & Smith, E. E
3.	Introduction to Psychology: Gateways to Mind and Behavior	Coon, D., & Mitterer, J.
4.	Development Across the Life Span	Feldman, R.
5.	Foundation of Psychology	Hayes, N
6.	Abnormal Psychology	Kring, A. M
7.	Organizational Psychology	Singh, P.
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.4-183/2016-R
Particulars of post	Associate Professor/Vice Principal (Botany) (Female) (BS-19), Islamabad Model Colleges for Girls, Federal Directorate of Education Islamabad, Capital Administration and Development Division
Minimum Qualification & Experience:	Ph.D. Degree in Botany with eight (8) years post qualification teaching and administrative experience at College/ University level. OR M. Phil Degree in Botany with ten (10) years post qualification teaching and administrative experience at College/ University level. OR Second Class or Grade 'C' Master's Degree in Botany with twelve (12) years post qualification teaching and administrative experience at College/ University level.

Part-I: (Botany)**50 Marks****I. 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.

II. Ecology

- Influence of climatic, edaphic and biotic factors on plant growth. Vegetation sampling techniques. Concepts of ecosystems and their productivity, ecological energetics, Pyramids (of numbers, biomass and energy), trophic levels, food chains and food webs. Biogeochemical cycles (Hydrological and Nitrogen). Succession.
- Causes and reclamation of soil salinity and water logging in Pakistan. Soil erosion, its control and soil conservation methods. Deforestation. Biodiversity conservation. Pollution.

III. Cytology

- Cell cycle, cellular morphology, chemistry of cell wall and cell membrane, cell to cell communication, plant tissue and cell culture, cell senescence and cell death.
- Ultra-structure of various cell organelles: Mitochondria, Golgi bodies, Endoplasmic reticulum, Plastids, Ribosomes, Glyoxysomes, Vacuoles, Nucleus.

IV. Genetics

- Mendelian Genetics, Multiple Alleles, Polygenic inheritance, Gene interaction, Epistasis and pleiotropy, Sex-linked inheritance, Chromosomal aberrations, Mutations, DNA repair.

V. Evolution

- Introduction of Evolution, Evolutionary history, Evolution of life, Convergent Evolution, Divergent Evolution, Parallel Evolution and Natural selection

VI. Molecular Biology

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

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

- Elements of Curriculum.
- Relationship of Education and Curriculum
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- Scientific Method and its Application in Education
- Sampling Techniques
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- Research Proposal and Report Writing

SUGGESTED READINGS

S. No.	Title	Author
1.	Plant Taxonomy and Biosystematics	Stac, C. A. 1980
2.	Plant Physiology	Taiz, L.& E. Zeiger 2006
3.	Genetics: A Conceptual Approach. 4th edition	Pierce, B. A. 2012
4.	Molecular Cell Biology	Lodish,H., A. Berk, S.L. Zipursky, P. Matsudaira
5.	Concepts of Genetics. 10th edition	William S. Klug. 2012
6.	Carvan Textbook of Botany Paper " A" (Morphology of Plants)	Malik, T. A. 2006
7.	Fundamentals of Ecology	Odum, E.P. and Barrett, G.W. 2004
8.	Growth and Differentiation in Plants	Phillips and Wareings
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