

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. 04/2019

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
1.	78/2019	Officer IT Expert-III (BS-17), Ministry of Defence.	Second Class or Grade 'C' Master's degree in Computer Science / Information Technology or equivalent qualification from a University recognized by HEC. OR Second Class or Grade 'C' Bachelor's degree (4 years duration) in Computer Science/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by 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"> • Open Source Interconnect (OSI) Model and Network Security • Advanced Analysis of malware using static and dynamic techniques • Types of malware. • Server side web applications attacks. • Cross-site scripting, • SQL Injection, • Cross-site request forgery, • Network protocols and service models. • Transport layer security, Network layer security, • Wireless security, • Embedded System Software • Cryptographic algorithms and design principles, including conventional and symmetric encryption • Data Acquisition Techniques from Smartphones or likewise devices. • Best practices of client side technologies like HTML, CSS, JavaScript & JQuery etc. • Cloud Networks and IoT Vulnerabilities & Security

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
2.	79/2019	Assistant Director Legal (BS-17), Directorate of Legal Affairs of Pakistan Railway (Railway Board), Ministry of Railways	i. LL.M. degree or Barrister-at – Law from a University/ Institute recognized by HEC. ii. Computer Literate in Microsoft Word, Excel and Spreadsheet. OR i. Second Class or Grade ‘C’ LL.B. degree from a University/ Institute recognized by HEC. ii. Two (2) years post qualification experience in legal matters. iii. Computer Literate in Microsoft Word, Excel and Spreadsheet.	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"> • Core courses of LL.B. Programme • Steps involved in Processing of Legal Cases • Basic Knowledge of Microsoft Office
3.	85/2019	Data Processing Assistant (BS-16), Federal Public Service Commission.	Second Class or Grade ‘C’ Bachelor’s degree in Computer Science/IT or equivalent. OR Second Class or Grade ‘C’ Bachelor’s degree with Mathematics/Statistics/ Physics/ Economics and one year diploma in Computer from the recognized Institution. Note: A competency test in IT/Computer shall be conducted as prescribed by the Commission.	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"> • Arithmetic Logical Unit, Memory (RAM, ROM) Types of RAM, Ports, etc. • Input and Output Devices, • Use of Microsoft Office • Application and System Software, • Electronic Data Processing • Management Information System • Storage and Multimedia, • Network & Security Issues,

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
4.	86/2019	Assistant Executive Engineer (Civil) (BS-17), Pak. PWD, Ministry of Housing & Works.	Bachelor's Degree in Civil Engineering from a recognized University.	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"> • Building material & Building Construction, • Surveying & Levelling, • Hydraulic & Hydrology, • Soil Mechanics & Foundation, • Concrete Technology & R.C.C Structure Design, • Steel Structure & Highway, • Construction Management, • Structural Design Applications, • Sewerage and Sewage Treatment, • Engineering Materials, • Reinforced Concrete, • Ground improvement, • Earth and Rock Structure
5.	87/2019	Assistant Executive Engineer (E/M) (BS-17), PAK. PWD, Ministry of Housing and Works.	Bachelor's Degree in Engineering in Electrical/Mechanical from a recognized University.	Objective Type Test (MCQ) Part-I English = 20 marks Part-II Professional Test=80 marks Note: keeping in view two distinct disciplines of Engineering, two independent tests will be developed in Part-II of the paper.	Part-I Vocabulary, Grammar Usage, Sentence Structuring, Part-II For candidates with <u>Electrical Engineering</u> degree <ul style="list-style-type: none"> • Electric Circuits, • Semiconductor Devices, • Electrical Instrumentation, • Power Transmission, • Power System Operation and Control, • Power System Protection, • High Voltage Engineering, • Electrostatics, • Electronic System Design, For candidates with <u>Mechanical Engineering</u> degree <ul style="list-style-type: none"> • Heat Transfer, • Thermodynamics, • Industrial Materials, • Machine Design and Drawing, • Mechanics of Machines, • Production Management & Quality control, • Workshop Technology, • Hydraulic Machines.

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6.	88/2019	Research Officer (BS-17), Manpower Section, Planning and Development Division.	Second Class or Grade 'C' Master's Degree or equivalent qualifications in Economics/ Sociology/ Social work/ Business Administration or Public Administration.	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"> • Research Methodology, • Project Management, • Project Evaluation, • Economic Development of Pakistan, • Organization of Economic Research, • Collection and Compilation of Data, • Methods of Data Analysis, • Report Writing and Presentation Skill.
7.	97/2019	Assistant Secretary (BS-16), National Industrial Relations Commission (NIRC), Ministry of Overseas Pakistanis & Human Resource Development	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
8.	98/2019	Hospital Dietitian (BS-17 Plus 25% Special Pay), Health Department, Gilgit Baltistan, Ministry of Kashmir Affairs and Gilgit Baltistan.	i. Second Class or Grade 'C' M.Sc. in Human Nutrition or equivalent from a University recognized by the HEC. ii. Two (2) years post qualification experience in the relevant field.	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"> • Fundamentals of Food & Nutrition • Principles of Diet Therapy. • Planning & Preparation of Balanced Diet. • Physiological aspect of Nutrition • Food Microbiology • Energy Value of Foods • Sanitation and Hygiene • Regulation of food intake, • Nutritional requirements • Nutrition Health & Prevention

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
9.	101/2019	Assistant Director (BS-17), Prime Minister's Inspection Commission, Prime Minister's Office.	i. Second Class or Grade 'C' Master's Degree in Business Administration/ Public Administration/ Economics/ H.R/ Commerce from a University recognized by the Higher Education Commission. ii. Two years post qualification experience in the field of Administration/ Accounts.	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"> Public Administration, Administrative Responsibility, Accountability & Reforms, Annual Budget Statement, Decision Making in Public Organizations, Performance Management in Public Organization in Pakistan, Structure of Federal and Provincial Governments in Pakistan, Salient features of economy of Pakistan,
10.	102/2019	Database Manager/ IT Professional (BS-17), S.E.C. Division, Ministry of Foreign Affairs	Second Class or Grade 'C' Bachelor's degree (4 years duration) in Computer Engineering/Computer Science/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by 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"> Electronic Data Processing Management Information System Networking Fundamentals Data Communication Database Management Techniques Operating System Introductory Hardware & Software Concepts Introductory Programming Concepts
11.	103/2019	Law Officer (BS-16), (Railway Board), Ministry of Railways	i. Second Class or Grade 'C' LL.B. degree from a University/ Institute recognized by HEC. ii. Computer Literate in Microsoft Word, Excel and Spreadsheet.	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"> Core courses of LL.B. Programme Steps involved in Processing of Legal Cases Basic Knowledge of Microsoft Office.

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
12.	104/2019	General Staff Officer-III (IT Expert) (BS-17), Ministry of Defence.	Second Class or Grade 'C' Master's degree in Computer Science/ Information Technology or equivalent qualification from a University recognized by HEC. OR Second Class or Grade 'C' Bachelor's degree (4 years duration) in Computer Science/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by 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"> • Open Source Interconnect (OSI) Model and Network Security • Advanced Analysis of malware using static and dynamic techniques • Types of malware. • Server side web applications attacks. • Cross-site scripting, • SQL Injection, • Cross-site request forgery, • Network protocols and service models. • Transport layer security, Network layer security, • Wireless security, • Embedded System Software • Cryptographic algorithms and design principles, including conventional and symmetric encryption • Data Acquisition Techniques from Smartphones or likewise devices. • Best practices of client side technologies like HTML, CSS, JavaScript & JQuery etc. • Cloud Networks and lot Vulnerabilities & Security
13.	105/2019	Librarian (Female) (BS-16), Federal Government Educational Institutions (Cantts/Garrisons) Directorate, Ministry of Defence	Second Class or Grade 'C' Bachelor's Degree with Diploma in Library Science. OR Bachelor of Library Science.	Objective Type Test (MCQ) Part-I English =20 marks Part-II Professional Test=80 marks	Part-I Grammar usage, Sentence Structure. Part-II <ul style="list-style-type: none"> • Introduction to Library & Information Science • Information Sources and Services • Classification: Theory and Practice • Cataloguing: Theory and Practice • Management of libraries & Information Centres • Research Methods & Techniques for Librarians • Public Records, Rare Material & their Conservation • Management of Serials Publications • Rules & Procedure of Write off the Library Losses

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14.	106/2019	Assistant Anesthetist (BS-17), Federal General Hospital, Chak Shahzad Islamabad, Ministry of National Health Services, Regulations & Coordination	MBBS or equivalent qualification recognized by PMDC.	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"> Core courses of MBBS Degree Program. Health Policies of the Government of Pakistan. Care vs Cure for Health Management. Major Challenges being faced by the Health Sector.
15.	107/2019	Assistant Private Secretary (BS-16), Naval Headquarters, Ministry of Defence	<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>
16.	108/2019	General Staff Officer-III (Tech Expert) (BS-17), Ministry of Defence.	<p>Second Class or Grade 'C' Master's degree in Computer Science/ Information Technology or equivalent qualification from a University recognized by HEC.</p> <p>OR</p> <p>Second Class or Grade 'C' Bachelor's degree (4 years duration) in Computer Science/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by HEC.</p>	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"> Open Source Interconnect (OSI) Model and Network Security Advanced Analysis of malware using static and dynamic techniques Types of malware. Server side web applications attacks. Cross-site scripting, SQL Injection, Cross-site request forgery, Network protocols and service models. Transport layer security, Network layer security, Wireless security, Embedded System Software Cryptographic algorithms and design principles, including conventional and symmetric encryption Data Acquisition Techniques from Smartphones or likewise devices. Best practices of client side technologies like HTML, CSS, JavaScript & JQuery etc. Cloud Networks and lot Vulnerabilities & Security

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
17.	116/2019	Assistant Architect (BS-17), PAK. PWD, Ministry of Housing and Works	Bachelor's Degree in Architecture or equivalent OR Associate of the Royal Institute of British Architects OR Member of a recognized Institute of Architects	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"> • Theory of Architecture • Architectural Design • Materials & Construction • Structure for Architects • Urban Design and Planning • Landscape Architecture • Computer Applications in Architecture
18.	119/2019	Assistant Secretary (BS-16), Directorate of Federal Government Educational Institutions (Cantts/ Garrisons), Ministry of Defence	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
19.	121/2019	Technical Expert (BS-17), Ministry of Defence. Category-A: For Technical Expert (BS-17) (Electrical/ Mechanical /Electronics) Category- B: For Technical Expert (BS-17) (Computer Science/ Information Technology)	Category-A: Bachelor's of Engineering in the relevant subject or equivalent qualification from a University recognized by HEC. Category- B: Second Class or Grade 'C' Master's degree in Computer Science/Information Technology or equivalent qualification from a University recognized by HEC. OR Second Class or Grade 'C' Bachelor's Degree (4 years duration) in Computer Science/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by HEC.	Objective Type Test (MCQ) Part-I English = 20 marks Part-II Professional Test=80 marks Note: For Cat-A separate papers may be designed as there is hardly any commonality in the syllabus of the three disciplines of Engineering.	For Cat-A Part-I Vocabulary, Grammar Usage, Sentence Structuring. Part-II For Electrical Engineer <ul style="list-style-type: none"> • Electric Circuits • Semiconductor Devices • Electrical Instrumentation • Power Transmission • Power System Operation and Control • Power System Protection • High Voltage Engineering • Electrostatics & Electronic System Design • DC Motors & Generators • Transmission Lines & Antennas • Basic IT/Computer Knowledge • DC Generators and Batteries • Power Factor and Power Factor Improvement

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
					<ul style="list-style-type: none"> • AC Fundamentals • AC Motors and AC Generators • Power System Analysis • Heating Ventilation and AC Equipment • Project Management • Alternative Energy Sources <p><u>For Electronics Engineer</u></p> <ul style="list-style-type: none"> • Power Electronics. • Digital Electronics. • Operational Amplifiers. • Electronic Instrumentations. • Logic Design & Switching Theory. • Circuit Theory, Electric Current and Ohm's law • Batteries • Electrostatics • Magnetic Circuits • Electrical Engineering Materials • Instruments and Measurements • DC Generators. • Transformers. • Transmission and Distribution Cables. • High Voltage Engineering • Rectifiers and Convertors. <p><u>For Mechanical Engineer</u></p> <ul style="list-style-type: none"> • Heat Transfer • Thermodynamics • Industrial Materials • Machine Design and Drawing • Mechanics of Machines • Production Management & Quality Control • Workshop Technology • Hydraulic Machines • Basic IT/Computer Knowledge • Heating Ventilation and AC Equipment (in depth knowledge)

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications/Experience for the Posts	Test Specification	Topics of Syllabi
					<p><u>For Cat-B</u> <u>Part-I</u> Vocabulary, Grammar Usage, Sentence Structuring.</p> <p><u>Part-II</u></p> <ul style="list-style-type: none"> • Information security terminology • Open Source Interconnect (OSI) Model and Network Security • Advanced Analysis of malware using static and dynamic techniques • Server side web applications attacks. • Cross-site scripting, • SQL Injection, • Cross-site request forgery, • Network protocols and service models. • Transport layer security, Network layer security, • Wireless security, • Embedded System Software • Cryptographic algorithms and design principles, including conventional and symmetric encryption • Data Acquisition Techniques from Smartphones or likewise devices.
20.	122/2019	<p>Preventive Officer (BS-16), Federal Board of Revenue, Revenue Division.</p>	<p>i. Second Class or Grade 'C' Bachelor's degree from a recognized University with Economics, Commerce, Statistics, Accounting, Computer Science, Law, Pharmacy, Chemistry or Physics as one of the subjects or B.Sc. Engineering in any speciality.</p> <p>ii. Computer literacy up to the level of MS Word, MS Power Point and MS Excel.</p>	<p>Objective Type Test (MCQ)</p> <p><u>Part-I</u> English = 20 marks</p> <p><u>Part-II</u> General Intelligence Test = 80 marks</p>	<p><u>Part-I</u> Grammar Usage, Sentence Structuring</p> <p><u>Part-II</u></p> <ul style="list-style-type: none"> • Basic Arithmetic. • Current Affairs. • Pakistan Affairs & Islamic Studies • Everyday/General Science • Knowledge of MS Office <p>Note : (Equal weightage for each topic at Part-II)</p>

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21.	123/2019	Assistant Secretary (BS-16), Ministry of States & Frontier Regions	<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>
22.	125/2019	Medical Officer (BS-17), Ministry of Defence.	<p>i. MBBS Degree or equivalent qualification from a University recognized by PM&DC.</p> <p>ii. Registered Medical practitioner with PM&DC.</p> <p style="text-align: center;">OR</p> <p>Retired Medical Officer of Pakistan Armed Forces.</p>	<p>Objective Type Test (MCQ)</p> <p>Part-I</p> <p>English = 20 marks</p> <p>Part-II</p> <p>Professional Test=80 marks</p>	<p>Part-I</p> <p>Vocabulary, Grammar Usage, Sentence Structuring.</p> <p>Part-II</p> <ul style="list-style-type: none"> • Core courses of MBBS Degree Program. • Health Policies of the Government of Pakistan. • Care vs Cure for Health Management. • Major Challenges being faced by the Health Sector.

**Scheme and Syllabus for Written Examination (Descriptive)
for all Posts in BS-20 advertised under Consolidated
Advertisement No. 04/2019**

Case No.	F.4-81/2019-R
Particulars of post	Chief (IT) (BS-20), Federal Public Service Commission.
Minimum Qualification & Experience:	<p>i. Second Class or Grade C Master Degree in Computer Science/ BCS (4 years)/ IT/ Electronics or equivalent. OR B.Sc. in Computer Engineering (software). OR Second Class or Grade C Master Degree in Mathematics/ Statistics/ Physics/ Economics and one year diploma in Computer from the recognized Institution.</p> <p>ii. Seventeen years experience in the field of Electronic Data Processing/ IT/ System Analysis/ Computer Programming/ Management and Administration of Database System dealing with Recruitment/ Administration/ Accounts/ Examination Development/ LAN/ Management of Website/ IT Training.</p>

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. 04/2019**

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.4-57-A/2019-R
Particulars of post	Assistant Professor (Male) (Mathematics) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (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. 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.4-57-B/2019-R
Particulars of post	Assistant Professor (Male) (Physics) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (Physics)**50 Marks****I. Mechanics**

- Vectors—Dots, Cross and triple products, Gradient, divergence and applications.
- Newtonian laws of motion; calculus based approach to kinematics, forces and dynamics, conservation law of energy; conservation of linear and angular momentum; Gravitation; planetary motion and satellites; Kepler's laws; centripetal forces
- Special theory of relativity. Michelson—Morley experiment and Einstein's postulates; Lorentz transformation; time dilation and length contraction; equivalence of mass and energy.

II. Waves and Oscillation

- Free oscillation with one and two degrees of freedom; forced and damped oscillations and phenomenon of resonance.
- Reflection, Refraction, Interference, Diffraction and Polarization of waves; interferometer and Newton's rings.

III. Heat and Thermodynamics

- Perfect gas and Van der Waals equation; Three Laws of Thermodynamics, internal energy, temperature, entropy. Thermal properties of Simple system production and measurement of low temperatures; Maxwellian distribution of molecular velocities; Brownian motion; Transport phenomena. Classical Maxwell-Boltzmann Statistics and its application.

IV. Electricity and Magnetism

- Gauss' law Electric potential and Poisson and Laplace's equation Dielectric medium and Polarization; Ampere's law; Vector potential; Magnetic properties of matter; Faraday's law of electromagnetic induction; Maxwell's equations; Poynting theorem and Poynting Vector. Maxwell's equations in integral and differential form.

V. Modern and Quantum Physics

- Operators and quantum states, time dependent and independent Schrodinger equation, angular momentum, wave mechanics, Heisenber's uncertainty relationship and indeterminacy based on commutation properties of operators, Bohr theory and quantum numbers including electron spin; Pauli's exclusion principle; Spectra of simple systems with one or two valence electrons. Lande's g factor and Zeeman effect. Raman effect; Waves and particles and De Broglie's Hypothesis.

VI. Solid State Physics

- Crystal lattice and structure, Bravais lattice, free electron model, Band theory and electron in a periodic potential, Fermi energy and density of states, n and p type semiconductors, physics of the transistor and MOSFET, dielectric properties, magnetic properties and origin of magnetism.

VII. Nuclear Physics

- Structure of Nuclei; Radioactivity, α , β and γ decay. Methods of detection, Phenomenon of fission; reactor and nuclear power, nuclear fusion and its application.

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.	Perspectives of Modern Physics.	A. Beiser.
2.	Fundamentals of Physics.	Halliday & Resnick
3.	Introduction to Electromagnetic Fields and Waves	D. Corson & P. Lorrain
4.	Heat and Thermodynamics.	D. Zemansky
5.	Introduction to Quantum Mechanics	D. Griffiths
6.	Modern Physics	Serway, Moses, Moyer.
7.	Solid State Physics	C. Kittel
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.4-57-C/2019-R
Particulars of post	Assistant Professor (Male) (Chemistry) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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, 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.4-57-D/2019-R
Particulars of post	Assistant Professor (Male) (Statistics) (BS-18) , Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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 (Statistics): 50 Marks**I. Probability Distributions**

Discrete and continuous Probability Distributions. Properties, applications of Binomial, Poisson, Hyper-geometric, Normal Distribution and its properties, Standard Normal Curve, Normal approximation to Binomial and Poisson distribution.

II. Regression Analysis & Correlation Analysis

Concepts of Regression and Correlation and their application, Simple and Multiple Linear Regression (upto three variables), Estimation of the Parameters, Method of least square, Inference regarding regression parameters

Correlation, Correlation Coefficient, Properties of Correlation Coefficient, Inference regarding correlation coefficient, Partial Correlation and Multiple Correlation (upto three variables).

III. Sampling & Sampling Distributions

Population and Sample, Advantages of Sampling, Sampling Design, Probability & Non-Probability Sampling techniques. Brief Concepts of Simple Random, Stratified, Systematic, Cluster, Multiple and Multistage Sampling. Purposive, Quota Sampling, Convenience & Accidental Sampling.

Sampling with and without replacement, Application of Central Limit Theorem in Sampling, Sampling Distribution of Mean, difference between two Means, Proportion, difference between two Proportion and Variance.

IV. Statistical Inferences

Estimation: Point Estimation, Properties of a good Estimator. Interval Estimation. Interval Estimation of Population mean. Large and small sample confidence intervals for Population Mean.

Hypothesis Testing: Types of errors. Hypothesis Testing for Population Mean. Inferences for Two Population Means. Inferences for the Mean of Two Normal Populations using Independent Samples (variances are assumed Equal). Inference for Two Populations Mean using Paired Samples. Inferences for Population Proportions. Confidence Intervals and hypothesis Testing for Population Proportion.

Inferences for Two Populations Proportions using Independent Samples, Estimation of sample size

Analysis of categorized data. Goodness of fit tests. Contingency tables. Test of independence in contingency tables.

V. Design of Experiments

One-way and Two-way Analysis of Variance, Design of Experiments, Concepts of Treatment, Replication, Blocking, Experimental Units and Experimental Error, Basic Principles of Design of Experiments, Description, Layout and Statistical Analysis of Completely Randomized Design (CRD), Randomized Complete Block Design (RCBD), Multiple Comparison tests (LSD test).

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.	Principles and Procedures of Statistics	Steel, R and Torrie, J.H.
2.	Introduction to Statistical Theory, Part-I & II	Chaudhry, S.M. and Kamal, S.
3.	Fundamentals of Modern Statistical Methods	Wilcox, R.
4.	Statistical Methods	Aggarwal, Y.P.
5.	Research in Education	JW Best
6.	Integrating Education Technology into Teaching	Roblyer
7.	Curriculum Development	S. M. Shahid
8.	Educational Measurement and Evaluation	S. M. Shahid
9.	Educational Administration	S. M. Shahid

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

Case No.	F.4-57-E/2019-R
Particulars of post	Assistant Professor (Male) (Economics) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (Economics)**50 Marks****I. Micro Economics**

Consumer behaviour, Determination of market demand and supply i.e. concept of elasticity of Demand & Supply, Static, Comparative Static Analysis, Distinction between partial and general equilibrium analysis (basic level) theory of the Firm, Producer's equilibrium, Pricing factors of production

II. Macro Economics

Basic Economic Concepts, National Income Accounting, Consumption Function, Multiplier, Accelerator, Component of Aggregate Demand, Labour Demand and Supply, Un-Employment, Determination of equilibrium level of income and output (at least with reference to two or three school of thought), Inflation.

III. Public Financing

Government expenditure, Sources of Government Revenue, Privatization, Taxes and non-taxes, Incidence of different taxes, Public Debt, Objectives, methods of repayment, Deficit financing, General Equilibrium Analysis, Welfare Economics, Fiscal Policy.

IV. Role of Foreign Trade and Aid in Economic Development

Trends in Pakistan's Balance of Payments, Terms of Trade, Changes in direction of trade, Trends in Pakistan's major exports and imports, Causes of significant changes in the trends, the role of migration and remittances in Pakistan's economy, costs and benefits of Foreign Aid, Role of Foreign Investment.

V. Major Issues in Pakistan Economy

Energy crisis, Corruption, Bad governance, External debt accumulation and dependency, Unemployment, Income inequality, Inflation, Fiscal and trade deficits, Balance of payment issues, Shortage of irrigation water.

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.	A Text-book of Economics Theory	Stonier & Hague
2.	Government Finance—An Economic Analysis	Due John, F.
3.	Microeconomic	Ferguson, C.E. & Gould, J.P., Nicholson, Mankiw
4.	Macroeconomics	Rudigar Dorubush and Stanley Fisher Blanchard
5.	Foreign Aid Theory and Practice in Southern Asia	Wolf, Jr. DC
6.	History of International Trade	Findlay, R and O' Rourke, K
7.	Research in Education	JW Best
8.	Integrating Education Technology into Teaching	Roblyer
9.	Curriculum Development	S. M. Shahid
10.	Educational Measurement and Evaluation	S. M. Shahid
11.	Educational Administration	S. M. Shahid

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

Case No.	F.4-57-F/2019-R
Particulars of post	Assistant Professor (Male) (Biology) (BS-18) , Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (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 mega sporogenesis, 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.
- 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.4-57-G /2019-R
Particulars of post	Assistant Professor (Male) (Health & Physical Education) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (Health and Physical Education) 50 Marks**I. Philosophical Basis of Physical Education**

Philosophy and Physical Education, Physical Education as Discipline, Scientific Foundation of Physical Education, Physical Education and Recreation, Leadership in Physical Education

II. Scientific Sports Coaching

Sports Planning, Periodisation of Training, Systemization of Training, Data Collection, Coach and Professional Ethics

III. Evaluation in Physical Education and Sports

Evaluation and Administration of Tests, Basic Statistics, Measurement of Physical Fitness, General Motor Ability, Cardiovascular Fitness, Rating Scales in Physical Education.

IV. Exercise Physiology

Muscular System and Exercise, Cardiovascular System and Exercise, Environment and Exercise, Nervous System and Exercise, Glandular System and Exercise, Gender Differences, Obesity

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.	Health & Physical Education.	Dr. A. Waheed Mughal
2.	Education in Physical Education.	Shamshad Ahmed
3.	Sports in Society : Issue & Controversies,	Jay Coackley
4.	Modern Measurement.	Osterlind J. Steven
5.	Introduction to Measurement in PE and Exercise Science	Margaret J. Safrit PhD, Terry M. Wood PhD
6.	Physiology of Sports	Reilly T and Williams
7.	Essentials of Exercise Physiology.	Shaver
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.4-57-H/2019-R
Particulars of post	Assistant Professor (Male) (English) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (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
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.4-57-I/2019-R
Particulars of post	Assistant Professor (Male) (Urdu) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (Urdu)**50 Marks**

- ۱۔ اردو ادب کا مطالعہ
- ۱۔ اردو زبان و ادب کی اسلامی شناخت
۲۔ بیسویں صدی کی ادبی تحریکیں
۳۔ پاکستانی ادب کی اصطلاح: تشکیل و روایت اور ارتقاء
- ۲۔ شعری ادب کا تنقیدی مطالعہ
- الف۔ دور قدیم
۱۔ میر (غزل - انتخاب میر مولوی عبدالحق)
۲۔ غالب (دیوان غالب)
۳۔ حالی (مسدس)
۴۔ اقبال (طلوع اسلام، مختصر راہ، مسجد قرطبہ)
- ب۔ دور جدید
۱۔ فیض (غزل - دست صبا)
۲۔ راشد (نظم - ایران میں جنبی)
۳۔ مجید امجد (نظم - شب رفتہ)
۴۔ ناصر کاظمی (غزل - برگ نے)
- ۳۔ نثری ادب کا تنقیدی مطالعہ
- الف۔ غیر افسانوی نثر
۱۔ شبلی (سیرت النبی ﷺ، جلد اول)
۲۔ مولوی عبدالحق (خاکے، چند ہم عصر)
- ب۔ افسانوی نثر
۱۔ منٹو (افسانے، منٹو کے بیس افسانے، مرتب ڈاکٹر انوار احمد، ڈاکٹر اے بی اشرف)
۲۔ احمد ندیم قاسمی (افسانے، کپاس کے پھول)
۳۔ مشتاق احمد یوسفی (ظفر و مزاج، آب گم)

۳۔ تفصیص۵۔ مضمون

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

ڈاکٹر وزیر آغا	۱۔ تہذیب اور تمدن پر اردو تہذیب
ڈاکٹر انوار رحمان	۲۔ اردو ادب کی تحریکیں
شیخ محمد اکرام	۳۔ آپ کوثر
شیخ محمد اکرام	۴۔ روکو کوثر
شیخ محمد اکرام	۵۔ موج کوثر
ڈاکٹر روبینہ شہناز	۶۔ اردو تہذیب میں پاکستانی تصوف و سیرت
مرتبین: ڈاکٹر رفیع الدین ہاشمی	۷۔ تقالیمات کے سوسال
ڈاکٹر سہیل عمر، ڈاکٹر وحید عشرت	
ترتیب نو: ڈاکٹر خواجہ محمد زکریا	۸۔ تاریخ ادبیات مسلمانان پاکستان و ہند
مرتب: ڈاکٹر نواز شعلی	۹۔ اردو ادب کے پچاس سال

S.No.	Title	Author
10.	Research in Education	JW Best
11.	Integrating Education Technology into Teaching	Roblyer
12.	Curriculum Development	S. M. Shahid
13.	Educational Measurement and Evaluation	S. M. Shahid
14.	Educational Administration	S. M. Shahid

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

Case No.	F.4-57-J/2019-R
Particulars of post	Assistant Professor (Male) (Pak.Studies) (BS-18) , Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (Pakistan Studies)**50 Marks**

- I. Ideology of Pakistan-----definition and elucidation, historical aspects: Muslim rule in the Sub-Continent, its downfall and efforts for Renaissance. Movements for reforms-- Shaikh Ahmad Sarhindi, Shah Waliullah, Sayyid Ahmad Shaheed, Aligarh, Deoband, Nadwah, and other educational institutions-----Sindh Madrassah and Islamia College Peshawar. Ideology of Pakistan in the light of Speeches and statements of Allama Iqbal and Quaid- i Azam Muhammad Ali Jinnah.
- II. Changing Security Dynamics for Pakistan: Challenges to National Security of Pakistan
- III. Pakistan War on Terror
- IV. Foreign Policy of Pakistan Post 9/11
- V. Evolution of Democratic System in Pakistan
- VI. Hydro Politics ; Water Issues in Domestic and Regional Context
- VII. Pakistan's National Interest
- VIII. Pakistan's Energy Problems and their Effects
- IX. Pakistan's Relations with Neighbours
- X. Pakistan and India Relations Since 1947
- XI. Kashmir Issue
- XII. The war in Afghanistan since 1979 and its impact on, and challenges to Pakistan, in the Post 2014 era.
- XIII. Latest Constitutional Amendments and Important Legislations,
- XIV. The Prevailing Social Problems of Pakistan and the Strategies to Deal with Them, Poverty, Education, Health and Sanitation.

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.	Federalism and Ethnic Conflict Regulation in India and Pakistan.	Adeney, Katharine. , New York: Palgrave Macmillan, 2007.
2.	Labor, Democratization and Development in India and Pakistan.	Candland, Christopher, New York: Routledge, 2007.
3.	Frontline Pakistan: The Struggle with Militant Islam.	Hussian, Zahid. New York: I.B.Tauris, 2007.
4.	Modern South Asia: History, Culture, Political Economy.	Jalal, Aisha and Bose, Sugata., New York: Routledge, 1998.
5.	Back to Pakistan: A Fifty Year Journey.	Mass, Leslie Noyes. Plymouth: Rowman & Littlefield Publishers, 2011.
6.	Pakistan: Manifest Destiny.	Qureshi, Atiff. London: Epic Press, 2009.
7.	Pakistan, America, and the Future of Global Jihad.	Riedel, Bruce. Deadly Embrace: Washington: Brookings Institute Press, 2011.
8.	Kashmir in Conflict: India, Pakistan and the Unending War.	Schofield, Victoria. New York: I.B.Tauria, 2003.
9.	A Brief History of Pakistan.	Wynbrandt, James. New York: Infobase Publishing, 2009.

S. No.	Title	Author
10.	Pakistan's Energy Sector: From Crisis to Crisis-Breaking the Chain	Zaid Alahdad
11.	Research in Education	JW Best
12.	Integrating Education Technology into Teaching	Roblyer
13.	Curriculum Development	S. M. Shahid
14.	Educational Measurement and Evaluation	S. M. Shahid
15.	Educational Administration	S. M. Shahid

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

Case No.	F.4-57-K/2019-R
Particulars of post	Assistant Professor (Male) (Zoology) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (Zoology)**50 Marks****I. Animal Diversity-Chordata**

- Fishes: Structural and functional adaptations of fishes.
- Amphibian: Movement onto land and early evolution of terrestrial vertebrates.
- Reptiles: Characteristics of reptiles, adaptations in reptilians.
- Birds: Migration and navigation, adaptations.
- Mammals: Structural and functional adaptations of mammals.

II. Principles of Animal Life

- Protozoa: Reproduction pattern in protozoan, Parasitism in protozoan
- Tissues Types: epithelial, connective, muscle and nervous tissue; organs and organ systems.
- Ecological Concepts: Interactions, Concepts and components of ecosystem, Food chain, Food web, Biogeochemical cycles, Forest, Biomes, Wildlife conservation and management, Environmental pollution, Green house effect, Acid rain, Global warming.

III. 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 canals, 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 Sense: Functional units of nervous systems, Synapses junctions between nerves.
- Chemical Coordination: Endocrine System; Vertebrate endocrine glands and types of hormones, Mechanism of hormones action,
- Animal Behavior: Learning, Habituation, Insight learning, latent learning, classical learning: Control of Behavior; social behavior

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.	Integrated Principles of Zoology.	Hickman, Jr. C.P., Keen, S. L, Larson, and Eisenhour, D.J.
2.	Zoology	Miller, S. A. and Harley, J. B.
3.	Biology	Campbell, N.A.
4.	Evolution. 2nd Edition	Douglas Futuyma
5.	Animal behavior: An Evolutionary Approach. 9 th Edition	John Alcock
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: PROFESSIONALMax Marks: 100Time Allowed: 3 Hours

Case No.	F.4-57-L/2019-R
Particulars of post	Assistant Professor (Male) (Computer Science) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (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.4-57-M/2019-R
Particulars of post	Assistant Professor (Male) (Islamic Studies) (BS-18), Federal Government Educational Institutions (FGEI) (Cantts/ Garrisons), Ministry of Defence.
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: (Islamic Studies)**50 Marks****I. Islam: the Code of Life**

- Salient features of Islamic;
 - Social System
 - Political System
 - Economic System
 - Judicial System
 - Administrative System
- Responsibilities of Civil Servants

II. Study of Seerah

Need and importance of the study of Seerah Prophet Mohammad (PBAH) as:

- The Role Model
- Merciful for the universe.
- Preacher
- Diplomat
- Teacher and Educationist
- Revolutionary Leader

III. Islamic Civilization and Culture:

- Meanings and the vital elements of Islamic Civilization and Culture
- Role of civilisation in the development of the human personality and communities
- Distinctions of Islamic Civilization;
 - Tauheed
 - Risalat
 - Spiritualism
 - Dignity of Man
 - Equality
 - Social Justice
 - Moral values
 - Tolerance
 - Rule of Law

IV. Islam and World

- Impact of Islamic Civilization on the West and vice-versa.
- Muslim World and the Contemporary Challenges
- Interaction between East and West.
- Role of Islam in the modern world.

I. اسلامی ضابطہ حیات

⇨ اسلامی نظام کی نمایاں خصوصیات:

- سماجی نظام
- سیاسی نظام
- اقتصادی نظام
- عدالتی نظام
- انتظامی نظام

⇨ سرکاری ملازمین کی ذمہ داریاں

II. سیرت النبی کا مطالعہ

⇨ سیرت النبی کے مطالعہ کی اہمیت اور ضرورت بطور:

- نمونہ عمل
- ہتھیبر امن
- مسلخ
- سفارت کار
- معلم انسانیت
- انقلابی رہنما

III. اسلامی تہذیب و ثقافت

⇨ اسلامی تہذیب و ثقافت کے معانی اور اہم اجزا

⇨ سماج اور انسانی شخصیت کی تعمیر میں تہذیب کا کردار

⇨ اسلامی تہذیب کے نمایاں اوصاف:

- توحید
- رسالت

- تزکیہ نفس
- انسانی عزت و وقار
- مساوات
- سماجی انصاف
- اخلاقی اقدار
- صبر و برداشت
- قانون کی حکمرانی

.IV اسلام اور دنیا:

- ↔ اسلامی تہذیب کے مغرب اور مغرب کے اسلامی تہذیب پر اثرات
- ↔ اسلام اور عصر حاضر کے چیلنجز
- ↔ مشرق اور مغرب کے درمیان بات چیت
- ↔ جدید دنیا میں اسلام کا مقام

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.	Islam: its meaning and Message	Khurshid Ahmad
2.	Islam: The Misunderstood Religion	Muhammad Qutub
3.	Towards Understanding Islam	Abul Aala Moudoodi
4.	Ideals and Realities of Islam	Hussain Nasr,
5.	A brief Survey of Muslim Science and Culture	Muhammad Abdur –Rahman
6.	Quranic Sciences	Afzalur Rahman
7.	Research in Education	JW Best
8.	Integrating Education Technology into Teaching	Roblyer
9.	Curriculum Development	S.M. Shahid
10.	Educational Measurement and Evaluation	S.M. Shahid
11.	Educational Administration	S.M. Shahid

PAPER-II: PROFESSIONALMax Marks: 100Time Allowed: 3 Hours

Case No.	F.4-67 /2019-R
Particulars of post	Deputy Chief/Project Management Specialist (BS-19), Ministry of Federal Education and Professional Training.
Minimum Qualification & Experience:	<p>i. Second Class or Grade 'C' Master's degree in Sciences (Natural/ Social)/Development Studies/Economics/Finance/ Public Administration/Business Administration or equivalent qualification from a University/ Institute recognized by HEC.</p> <p style="text-align: center;">OR</p> <p>Second Class or Grade 'C' Bachelor's degree in Engineering (in any field)</p> <p>ii. Twelve (12) years post qualification experience of Planning/ Implementation/Monitoring in PSDP Projects.</p> <p style="text-align: center;">OR</p> <p>i. M.Phil. in Sciences (Natural/ Social)/Development Studies/Economics/Finance/ Public Administration/Business Administration or equivalent qualification from a University/ Institute recognized by HEC.</p> <p style="text-align: center;">OR</p> <p>Second Class or Grade 'C' Master's degree in Engineering (in any field)</p> <p>ii. Ten (10) years post qualification experience of Planning/ Implementation/Monitoring in PSDP Projects.</p>

Part-I: 50 Marks

(Public Administration, Office Management and Planning)

- I. **Public Administration:** Nature and scope, Role of Public Administration in a modern Welfare State;
- II. **Administrative Leadership:** Approaches to the study of Leadership, Forms of Leadership, Leadership qualities;
- III. **Administrative Accountability:** Internal and External Controls; Executive Control, Legislative Control, Judicial Control, Ombudsman, Public Opinion and Pressure Groups; Problems of Administrative Accountability in Pakistan;
- IV. **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) Statistical Techniques
All statistical techniques related to Planning & Research

- V. Civil Servant Act 1973 and Rules made thereunder;
VI. PPRA Ordinance and Rules 2004.

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, 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, 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.	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.	Project Management Body of Knowledge,	Project Management Institute (PMI) standards committee
6.	Human Resource Management	H.T.Graham & Roger Bennett
7.	Management	James A.F.Stoner, R.Eward Freeman, Daniel R.Gilbert Jr.
8.	Understanding Computer: Today and Tomorrow	Deborah Morley, Charles Parker
9.	MS Office 365 Handbook: 2013 Edition	Kevin Wilson

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

Case No.	F.4-77 /2019-R
Particulars of post	Joint Director Legal Affairs (BS-19) , Directorate of Legal Affairs of Pakistan Railways, (Railway Board), Ministry of Railways.
Minimum Qualification & Experience:	i. LL.M. degree or Barrister-at-Law from a University/ Institute recognized by HEC. ii. Ten (10) years post qualification experience as an Advocate of Supreme Court/High Court. iii. Computer Literate in Microsoft Word, Excel and Spreadsheet. OR i. Second Class or Grade 'C' LL.B. degree from a University/ Institute recognized by HEC. ii. Twelve (12) years post qualification experience as an Advocate of Supreme Court/High Court. iii. Computer Literate in Microsoft Word, Excel and Spreadsheet.

LAW: 100 Marks**I. Definitions of Crime****II. All Provisions of:**

- i. Concept of arbitration, arbitration with or without intervention of court and in civil suits.
- ii. Establishment of Civil Courts with their Original & Appellate Jurisdiction.
- iii. The Code of Civil Procedure, 1908
- iv. Pakistan Penal Code, 1860
- v. Qanun-e-Shahdat Order, 1984
- vi. Criminal Procedure Code, 1898

SUGGESTED READINGS

S.No.	Title	Author
1.	Pakistan Penal Code, 1860	M. Mahmood
2.	Criminal Procedure Code, 1898	Shaukat Mahmood
3.	Law of Evidence	Justice (R) Khalid ur Rahman Khan
4.	Qanun-e-Shahdat Order, 1984	as adapted from Principles and Digest of the Law of Evidence by M. Monir
5.	The Code of Civil Procedure, 1908	Aamir Raza A. Khan
6.	The Arbitration Laws in Pakistan	M. Mahmood
7.	Civil Courts Ordinance, 1962	Nisar Ahmad Nisar

PAPER-II: PROFESSIONALMax Marks: 100Time Allowed: 3 Hours

Case No.	F.4-80/2019-R
Particulars of post	Deputy Chief Administrative Officer (BS-18), GHQ, Ministry of Defence
Minimum Qualification & Experience:	i. Second class or Grade "C" Master's Degree in Business Administration Public Administration or equivalent from a university recognized by HEC. ii. Five (5) years post qualification experience in administration.

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(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.	An Introduction to the Public Administration	E.N. Cladden
2.	Bureaucracy: Modern Society	Pebr, M.Blau.
3.	Public Administration for a Welfare State	Paul Abbleby
4.	The Bureaucracy of Pakistan	Charles F. Kennedy
5.	Human Resource Management	H.T.Graham & Roger Bennett
6.	Management	James A.F.Stoner, R.Eward Freeman, Daniel R.Gilbert Jr.
7.	Understanding Computer: Today and Tomorrow	Deborah Morley, Charles Parker
8.	MS Office 365 Handbook: 2013 Edition	Kevin Wilson

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

Case No.	F.4-82/2019-R
Particulars of post	Officer IT Expert-I (BS-19), Ministry of Defence.
Minimum Qualification & Experience:	<ul style="list-style-type: none"> i. Ph.D in Computer Sciences/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by HEC. ii. Eight (8) years post qualification working experience in Computer Networking/ Software Engineering/ Programming/ Database Management/ Information Security/ Cyber Security. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> i. M.Phil in Computer Science/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by HEC. ii. Ten (10) years post qualification working experience in Computer Networking/ Software Engineering/ Programming/ Database Management/ Information Security/ Cyber Security. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> i. Second Class or Grade 'C' Master's degree in Computer Science/ Information Technology or equivalent qualification from a University recognized by HEC. ii. Twelve (12) years post qualification working experience in Computer Networking/ Software Engineering/ Programming/ Database Management/ Information Security/ Cyber Security.

Professional: 100 Marks**I. Data Structures and Algorithms**

Abstract data types, Hardware Reverse Engineering of embedded systems, divide and conquer algorithms, Sorting algorithms (selection, insertion, merge, quick, bubble, heap, shell, radix, bucket), queue, dequeuer, priority queues (linked and array implementations of queues), linked list & its various types, sorted linked list, searching an unsorted array, memory management and garbage collection.

II. Data Encryption and Security

Advanced Forensics Techniques for Windows/MMacOS/Linux/Andriod, Cryptographic algorithms and design principles, including conventional and symmetric encryption (DES, IDEA, Blowfish, Rijndael, RC-4, RC-5), public key or asymmetric encryption (RSA, Diffie-Hellman), key management, hash functions (MD5, SHA-1, RIPEMD-160, HMAC), digital signatures and certificates. Authentication protocols (X.509, Kerberos), electronic mail security (S/MIME, PGP), web security and protocols for secure electronic commerce (IPSec, SSL, TLS, SET). Security mechanism (ASLR, DEP, SHE, Android Permission Modelling and sandboxing)

III. Cyber Security

Basic security concepts, Information security terminology, Malware classifications, Types of malware. Server side web applications attacks. Cross-site scripting, SQL Injection, Cross-site request forgery, Planning and policy, Network protocols and service models. Transport layer security, Network layer security, Wireless security, Cloud Networks & IoT vulnerabilities and security.

IV. Information Security

Information security foundations, security design principles; security mechanisms, symmetric and asymmetric cryptography, encryption, hash functions, digital signatures, key management, authentication and access control; software security, vulnerabilities and protections, malware, database security; network security, firewalls, intrusion detection; security policies, policy formation and enforcement, risk assessment, cybercrime, law and ethics in information security, privacy and anonymity of data.

SUGGESTED READINGS

Sr. No.	Title	Author
1.	Data Structures and Algorithms in C++	Adam Drozdek
2.	Data Structures and Algorithm Analysis in Java	Mark A. Weiss
3.	Data Structures and Abstractions with Java	Frank M. Carrano & Timothy M. Henry
4.	Data Structures and Algorithm Analysis in C++	Mark Allen Weiss
5.	Java Software Structures: Designing and Using Data Structures	John Lewis and Joseph Chase
6.	Cryptography and Network Security: Principles and Practice, 6th edition	William Stallings,
7.	Security+ Guide to Network Security Fundamentals	Mark Ciampa
8.	Corporate Computer Society	Randall J.Boyle, 3rd Edition
9.	Computer Security: Principles and Practice, 3rd edition	William Stallings
10.	Principles of Information Security, 6th edition	M. Whitman and H. Mattord
11.	Computer Security, 3rd edition	Dieter Gollmann
12.	Computer Security Fundamentals, 3rd edition	William Easttom
13.	Official (ISC) 2 Guide to the CISSP CBK, 3rd edition	

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

Case No.	F.4-83/2019-R
Particulars of post	Deputy Chief (IT) (BS-19), Federal Public Service Commission.
Minimum Qualification & Experience:	<p>i. Second Class or Grade C Master Degree in Computer Science/ BCS (4 years)/ IT/ Electronics or equivalent. OR B.Sc. in Computer Engineering (software). OR Second Class or Grade C Master Degree in Mathematics/ Statistics/ Physics/ Economics and one year diploma in Computer from the recognized Institution.</p> <p>ii. Twelve (12) years experience in the field of Electronic Data Processing/ IT/ System Analysis/ Computer Programming/ Management and Administration of Database System dealing with Recruitment/ Administration/ Accounts/ Examination Development/ LAN/ Management of Website/ IT Training.</p>

Professional: 100 Marks**I. Data Structures and Algorithms**

Abstract data types, Hardware Reverse Engineering of embedded systems, divide and conquer algorithms, Sorting algorithms (selection, insertion, merge, quick, bubble, heap, shell, radix, bucket), queue, dequeuer, priority queues (linked and array implementations of queues), linked list & its various types, sorted linked list, searching an unsorted array, memory management and garbage collection.

II. Data Encryption and Security

Advanced Forensics Techniques for Windows/MacOS/Linux/Android, Cryptographic algorithms and design principles, including conventional and symmetric encryption (DES, IDEA, Blowfish, Rijndael, RC-4, RC-5), public key or asymmetric encryption (RSA, Diffie-Hellman), key management, hash functions (MD5, SHA-1, RIPEMD-160, HMAC), digital signatures and certificates. Authentication protocols (X.509, Kerberos), electronic mail security (S/MIME, PGP), web security and protocols for secure electronic commerce (IPSec, SSL, TLS, SET). Security mechanism (ASLR, DEP, SHE, Android Permission Modelling and sandboxing)

III. Cyber Security

Basic security concepts, Information security terminology, Malware classifications, Types of malware. Server side web applications attacks. Cross-site scripting, SQL Injection, Cross-site request forgery, Planning and policy, Network protocols and service models. Transport layer security, Network layer security, Wireless security, Cloud Networks & IoT vulnerabilities and security.

IV. Information Security

Information security foundations, security design principles; security mechanisms, symmetric and asymmetric cryptography, encryption, hash functions, digital signatures, key management, authentication and access control; software security, vulnerabilities and

protections, malware, database security; network security, firewalls, intrusion detection; security policies, policy formation and enforcement, risk assessment, cybercrime, law and ethics in information security, privacy and anonymity of data.

SUGGESTED READINGS

Sr. No.	Title	Author
1.	Data Structures and Algorithms in C++	Adam Drozdek
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3.	Data Structures and Abstractions with Java	Frank M. Carrano & Timothy M. Henry
4.	Data Structures and Algorithm Analysis in C++	Mark Allen Weiss
5.	Java Software Structures: Designing and Using Data Structures	John Lewis and Joseph Chase
6.	Cryptography and Network Security: Principles and Practice, 6th edition	William Stallings,
7.	Security+ Guide to Network Security Fundamentals	Mark Ciampa
8.	Corporate Computer Society	Randall J.Boyle, 3rd Edition
9.	Computer Security: Principles and Practice, 3rd edition	William Stallings
10.	Principles of Information Security, 6th edition	M. Whitman and H. Mattord
11.	Computer Security, 3rd edition	Dieter Gollmann
12.	Computer Security Fundamentals, 3rd edition	William Easttom
13.	Official (ISC) 2 Guide to the CISSP CBK, 3rd edition	

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

Case No.	F.4-91/2019-R
Particulars of post	Superintending Engineer (B&R/E&M) , (BS-19), M.E.S, Ministry of Defence (Defence Division).
Minimum Qualification & Experience:	i. Second Class or Grade 'C' Master's Degree in Civil/ Electrical/ Mechanical Engineering from a recognized University. ii. Ten (10) years experience in the field of Civil/ Electrical/ Mechanical Engineering in BS-17 and above or equivalent.

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

Structures; stress, strain, shearing force and bending moment concepts, beams, columns, footing. Simply supported and Cantilever beams, Pulleys and gears. Estimation, Quantity Surveying, Composite Schedule of Rates, Surveying and Levelling, Plain Tabling, Theodolite Survey;

II. Costing, Accounting and Budgeting:

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

III. Mechanical Engineering Fundamentals

Mechanics and Strength of Materials: Concept of Stress and Strain, bending, torsion, geometric properties of areas, principal stresses, Tensile testing, Stress- Strain curve, True Stress & Strain, Shear Stress & Strain, Concept of elastic and plastic deformation, Yield & ultimate Tensile strengths, Elongation, Toughness and Resilience, Ductility and Malleability, Hardness Testing, Brinell and Rock well Hardness test, bending moment,

Fluid Mechanics: Properties and basics of fluid mechanics, loss of head, power transformation by fluids, pumps, turbines. Fluid static's, Fluid dynamics, Types of flow: Turbulent and Laminar, Reynold's number.

Manufacturing: Different manufacturing processes like Casting, Forging, Machining, Rolling, Extrusion, Wire-drawing, welding, Turning (lathe), Milling, Shaping, Gear cutting, Drilling, Fitting.

IV. Electricity & Electronics

Electricity & Magnetism; Electrical potential, Resistance, Laws of resistance, Conductance, Conductivity, Impedance, Ohm law, Resistance in series and in parallel, practical resistors, work, power, Energy, Joule's law of electric field intensity, Gauss's Theorem, Capacitor, Capacitance, Capacitors in parallel and series. Force on a conductor in a magnetic field, electrical and magnetic circuits, leakage flux, Relation between magnetism and electricity, Induced emf, induced current and directions, Faraday's laws of electromagnetic inductions, Lenz's law, dynamically induced emf, Self inductance, mutual inductance and inductance in series/parallel, magnetic hysteresis, Energy stored in magnetic field, Generation of alternating currents and voltages.

V. Electrical Machines

DC Motors: Shunt, Series and Compound Motors, Speed and Torque Relations. Transformers: Principle, Construction, Voltage transformation ratio, Step-up/stepdown transformers, Copper & Iron Losses, Transformer connections; delta and star.

AC Motors: Induction motor, Synchronous motor, Performance, Efficiency. Single phase and three phase Motors.

Generators: Principle, Construction, Different components of generators. AC Generators, DC Generators.

VI. Project Management:

Time lines, milestones, resources allocation, dependency, Gant Charts, Preparation of PC-I, PC-II, PC-III & PC-IV, Financial Management of Projects

VII. Inventory Management:

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

VIII. 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.	Plain and reinforced concrete	Nilson.
2.	Strength of material	Andrew Pytel and Singer.
3.	Civil Engineer's Reference Book	LS Blake
4.	Surveying and Leveling	T.P Kanetaker.
5.	Public Health Engineering	STEEL.
6.	Fluid mechanics with engineering applications	Finnemore/ Franzini.
7.	Schaum Outline Series; Strength of Materials	Williym A. Nash
8.	Manufacturing Processes for Engineering Materials	Kalpakgjian
9.	Electrical Technology	B.L. Tharaja
10.	Electronic Devices and Circuits.	Bogart
11.	DC Machines	P.C. Sen
12.	Semiconductors	Manzar Saeed
13.	Handbook of Engineering Management	Dennis Lock.
14.	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.4-94/2019-R
Particulars of post	Officer IT Expert-II (BS-18), Ministry of Defence.
Minimum Qualification & Experience:	<p>i. M. Phil. in Computer Sciences/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by HEC.</p> <p>ii. One (1) year post qualification working experience in Computer Networking/ Software Engineering/ Programming/ Database Management/ Information Security/ Cyber Security.</p> <p style="text-align: center;">OR</p> <p>i. Second Class or Grade 'C' Master's degree in Computer Science/ Information Technology or equivalent qualification from a University recognized by HEC.</p> <p>ii. Five (5) years post qualification working experience in Computer Networking/ Software Engineering/ Programming/ Database Management/ Information Security/ Cyber Security.</p>

Professional: 100 Marks**I. Data Structures and Algorithms**

Abstract data types, Hardware Reverse Engineering of embedded systems, divide and conquer algorithms, Sorting algorithms (selection, insertion, merge, quick, bubble, heap, shell, radix, bucket), queue, dequeuer, priority queues (linked and array implementations of queues), linked list & its various types, sorted linked list, searching an unsorted array, memory management and garbage collection.

II. Data Encryption and Security

Advanced Forensics Techniques for Windows/MacOS/Linux/Android, Cryptographic algorithms and design principles, including conventional and symmetric encryption (DES, IDEA, Blowfish, Rijndael, RC-4, RC-5), public key or asymmetric encryption (RSA, Diffie-Hellman), key management, hash functions (MD5, SHA-1, RIPEMD-160, HMAC), digital signatures and certificates. Authentication protocols (X.509, Kerberos), electronic mail security (S/MIME, PGP), web security and protocols for secure electronic commerce (IPSec, SSL, TLS, SET). Security mechanism (ASLR, DEP, SHE, Android Permission Modelling and sandboxing)

III. Cyber Security

Basic security concepts, Information security terminology, Malware classifications, Types of malware. Server side web applications attacks. Cross-site scripting, SQL Injection, Cross-site request forgery, Planning and policy, Network protocols and service models. Transport layer security, Network layer security, Wireless security, Cloud Networks & IoT vulnerabilities and security.

IV. Information Security

Information security foundations, security design principles; security mechanisms, symmetric and asymmetric cryptography, encryption, hash functions, digital signatures, key management, authentication and access control; software security, vulnerabilities and protections, malware, database security; network security, firewalls, intrusion detection; security policies, policy formation and enforcement, risk assessment, cybercrime, law and ethics in information security, privacy and anonymity of data.

SUGGESTED READINGS

Sr. No.	Title	Author
1.	Data Structures and Algorithms in C++	Adam Drozdek
2.	Data Structures and Algorithm Analysis in Java	Mark A. Weiss
3.	Data Structures and Abstractions with Java	Frank M. Carrano & Timothy M. Henry
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6.	Cryptography and Network Security: Principles and Practice, 6th edition	William Stallings,
7.	Security+ Guide to Network Security Fundamentals	Mark Ciampa
8.	Corporate Computer Society	Randall J.Boyle, 3rd Edition
9.	Computer Security: Principles and Practice, 3rd edition	William Stallings
10.	Principles of Information Security, 6th edition	M. Whitman and H. Mattord
11.	Computer Security, 3rd edition	Dieter Gollmann
12.	Computer Security Fundamentals, 3rd edition	William Easttom
13.	Official (ISC) 2 Guide to the CISSP CBK, 3rd edition	

PAPER-II: PROFESSIONALMax Marks: 100Time Allowed: 3 Hours

Case No.	F.4-95/2019-R
Particulars of post	Director (LAB/NEQS) (BS-19), 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. Twelve (12) years post qualification experience in BS-17 or above or equivalent in any of the prescribed educational qualification in Govt./ Semi-Govt./ Reputable Organization.

Professional: 100 Marks

- I. Photosynthesis: Plant pigments, Light reaction, CO₂ fixation, Mechanism of photophosphorylation.
- II. Respiration: Glycolysis, Krebs cycle, Mechanism of oxidative phosphorylation.
- III. Molecular Biology: Nucleic acids, DNA as hereditary material, DNA replication, Transcription, Genetic code, Protein synthesis, Genetic engineering and its application, Genetically Modified Organisms (GMO).
- IV. Inorganic Chemical Industries.—Sulphuric Acid, Fixation of Nitrogen, Chemical Fertilizers, Semi-conductivity devices. Cement, Glass and Ceramics.
- V. 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).
- VI. Surface Chemistry and Catalysis.—Physical adsorption and chemisorption. Surface area determination. Homogeneous and Heterogeneous Catalysis. Acid-base and Enzyme Catalysis.
- VII. 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.
- VIII. Aromatic Chemistry.—Structure of Benzene with particular reference to Mechanism of Electrophilic Substitution Reactions.
- IX. Chemistry of Natural Products.—Elementary study of Carbohydrates. Oils and Fats. Alkaloids and Vitamins.
- X. Industrial Organic Chemistry.—Organic Polymers. Fermentation processes including preparation of Anti-Biotics. Petro-Chemical Industry.
- XI. Environmental Pollution: Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Solid Waste, Water Logging & Salinity, Deforestation, Desertification, Eutrophication, Global and regional air pollution problems (Greenhouse effect, Global Warming/Climate Change, Ozone Depletion, Acid Rain).

XII. Climate Change: Climate Pattern at local, regional and global scale. Different types of climate including tropical and mid latitude climate, polar climates. Climate change processes, Drivers and Indicators of Climate Change, Effects of Climate Change on natural and societal systems. Carbon foot print. Climate change adaptation and mitigation, Clean Development Mechanism (CDM), REDD+. Global environmental politics on climate change: role of India, China and USA (Copenhagen Accord 2009).

XIII. Environmental Laws

SUGGESTED READINGS

S. No.	Title	Author
1.	Plant Physiology	Taiz, L.& E. Zeiger
2.	Ilmi Biomolecules, Cell Biology and Genetics.	Cheema, T.A. and Cheema Z.T.
3.	Plant and Environment	Daubermine, R, F
4.	Environmental Science: Earth as a living Planet	Botkin, D. Keller, E.
5.	Environmental Health; Ecological Perspective	Kathryn Hilgenkamp
6.	Advanced Inorganic Chemistry 3rd Ed.	Cotton. F.A. and Wilkinson Groffrey
7.	Inorganic Chemistry, 3rd Ed. 1983	Hukeavy, James E.
8.	Physical Chemistry 5th Ed.	Moore, Walter J.
9.	Mechanism & Structure in Organic Chemistry	Gould, Edwards
10.	Organic Chemistry 2nd Ed.	Morrison, Robert Thornton & Boyd R.N.

PAPER-II: PROFESSIONALMax Marks: 100Time Allowed: 3 Hours

Case No.	F.4-96/2019-R
Particulars of post	Deputy Director (BS-18), Federal Seed Certification & Registration Department, Ministry of National Food Security & Research
Minimum Qualification & Experience:	<p>i. Second Class or Grade 'C' Master's Degree in Agriculture in one of the subjects of Seed Technology, Plant Breeding, Plant Pathology, Plant Physiology, Agronomy, Plant Protection, Horticulture, Entomology and Agriculture Extension OR M.Sc. (Botany).</p> <p>ii. At least five (5) years post qualification experience in Seed certification and Seed testing.</p>

Part-I: 20 Marks

(Basic Concepts only)

- I. Public Administration
- II. Human Resource Management
- III. Financial Management
- IV. Information Technology and MS Office

Part-II: 80 Marks

(Professional)

- I. **Concept of Integrated Agriculture:** Components of natural resources as bases for agriculture production (Land, Water, biological, Environmental, Solar, Energy)
- II. **Challenges in Pakistan's Agriculture:** Present scenario and future prospects. Analytical overview: issues and strategies for improvement of crop management, livestock management, fisheries, cottage industry, resource management and rural development. Institutions and policies: issues and options.
- III. **Elements of Climate and their Relationship with Crop Growth:** Farming Systems, biological nitrogen fixation, soil profile, structure and texture, soil fertility, soil erosion and conservation, water logging and salinity
- IV. **Genetic Improvement for Crop Production:** GMO crops, Seed production technology.
- V. **Horticulture:** Floriculture, landscaping, pests and diseases of agriculture crops and their control, integrated pest management.
- VI. **Rainfed and Irrigated Agriculture:** Agriculture mechanization, land tenure and land reforms, role of agriculture in national economy.

Suggested Reading

S.No.	Title	Author
1.	An Introduction to the Public Administration	E.N.Cladden
2.	Human Resource Management	H.T.Graham & Roger Bennett
3.	System of Financial Control and Budgeting, 2006	Published by Finance Division
4.	Understanding Computers: Today and Tomorrow	Deborah Morley, Charles Parker
5.	MS Office 365 Handbook: 2013 Edition	Kevin Wilson
6.	Participatory Rural Development in Pakistan	Khan, M. H
7.	Agriculture in Pakistan	Khan M. H.
8.	Fundamentals of Soil Science	Henry D. Foth
9.	Manual of Plant Production	Abdul Manan.
10.	Principles of Field Crop Production	Martin., J.H. & Leonard, W.H.
11.	Diseases of Field Crops	Dickson, J.G
12.	Irrigation Principles & Practices	Isrealson, O.W. Vaughn, E. Hansen.
13.	A Text Book of Plant Pathology	A.V.S.S. Sambamurti
14.	The Principles of Agronomy.	Harris, Franklin Stewart

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

Case No.	F.4-100/2019-R
Particulars of post	Database Manager/ IT Professional (BS-18), S.E.C. Division, Ministry of Foreign Affairs
Minimum Qualification & Experience:	<p>i. Second Class or Grade 'C' Master's degree in Computer Engineering/Computer Science/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by HEC.</p> <p style="text-align: center;">OR</p> <p>Second Class or Grade 'C' Bachelor's degree (4 years duration) in Computer Engineering/Computer Science/ Software Engineering/ Information Technology or equivalent qualification from a University recognized by HEC.</p> <p>ii. Five (5) years post qualification experience in the relevant field.</p>

Professional: 100 Marks**I. Data Structures and Algorithms**

Abstract data types, Hardware Reverse Engineering of embedded systems, divide and conquer algorithms, Sorting algorithms (selection, insertion, merge, quick, bubble, heap, shell, radix, bucket), queue, dequeuer, priority queues (linked and array implementations of queues), linked list & its various types, sorted linked list, searching an unsorted array, memory management and garbage collection.

II. Data Encryption and Security

Advanced Forensics Techniques for Windows/MacOS/Linux/Android, Cryptographic algorithms and design principles, including conventional and symmetric encryption (DES, IDEA, Blowfish, Rijndael, RC-4, RC-5), public key or asymmetric encryption (RSA, Diffie-Hellman), key management, hash functions (MD5, SHA-1, RIPEMD-160, HMAC), digital signatures and certificates. Authentication protocols (X.509, Kerberos), electronic mail security (S/MIME, PGP), web security and protocols for secure electronic commerce (IPSec, SSL, TLS, SET). Security mechanism (ASLR, DEP, SHE, Android Permission Modelling and sandboxing)

III. Cyber Security

Basic security concepts, Information security terminology, Malware classifications, Types of malware. Server side web applications attacks. Cross-site scripting, SQL Injection, Cross-site request forgery, Planning and policy, Network protocols and service models. Transport layer security, Network layer security, Wireless security, Cloud Networks & IoT vulnerabilities and security.

IV. Information Security

Information security foundations, security design principles; security mechanisms, symmetric and asymmetric cryptography, encryption, hash functions, digital signatures, key management, authentication and access control; software security, vulnerabilities and

protections, malware, database security; network security, firewalls, intrusion detection; security policies, policy formation and enforcement, risk assessment, cybercrime, law and ethics in information security, privacy and anonymity of data.

SUGGESTED READINGS

Sr. No.	Title	Author
1.	Data Structures and Algorithms in C++	Adam Drozdek
2.	Data Structures and Algorithm Analysis in Java	Mark A. Weiss
3.	Data Structures and Abstractions with Java	Frank M. Carrano & Timothy M. Henry
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6.	Cryptography and Network Security: Principles and Practice, 6th edition	William Stallings,
7.	Security+ Guide to Network Security Fundamentals	Mark Ciampa
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10.	Principles of Information Security, 6th edition	M. Whitman and H. Mattord
11.	Computer Security, 3rd edition	Dieter Gollmann
12.	Computer Security Fundamentals, 3rd edition	William Easttom
13.	Official (ISC) 2 Guide to the CISSP CBK, 3rd edition	

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

Case No.	F.4-124/2019-R
Particulars of post	Deputy Engineering Adviser (Power)/ Government Inspector Of Electricity (BS-19), Office of the Chief Engineering Adviser/ Chairman Federal Flood Commission, Ministry of Water Resources.
Minimum Qualification & Experience:	<p>i. Bachelor's Degree in Electrical Engineering or an equivalent qualification from a recognized University/ Institution.</p> <p>ii. Twelve (12) years post qualification experience in Planning, Design or operation of Hydroelectric or Thermal Power Stations or High Voltage Transmission Systems, or distribution systems in BS-17 and above or equivalent in a Government/ semi-Government/ reputable private organization.</p>

Engineering: 100 Marks**I. Electricity & Electronics:**

Electricity & Magnetism; Electrical potential, Resistance, Laws of resistance, Conductance, Conductivity, Impedance, Ohm law, Resistance in series and in parallel, practical resistors, work, power, Energy, Joule's law of electric field intensity, Gauss's Theorem, Capacitor, Capacitance, Capacitors in parallel and series. Force on a conductor in a magnetic field, electrical and magnetic circuits, leakage flux, Relation between magnetism and electricity, Induced emf, induced current and directions, Faraday's laws of electromagnetic inductions, Lenz's law, dynamically induced emf, Self inductance, mutual inductance and inductance in series/parallel, magnetic hysteresis, Energy stored in magnetic field, Generation of alternating currents and voltages.

II. Electrical Machines:

DC Motors: Shunt, Series and Compound Motors, Speed and Torque Relations. Transformers: Principle, Construction, Voltage transformation ratio, Step-up/stepdown transformers, Copper & Iron Losses, Transformer connections; delta and star.

AC Motors: Induction motor, Synchronous motor, Performance, Efficiency. Single phase and three phase Motors.

Generators: Principle, Construction, Different components of generators. AC Generators, DC Generators.

III. Power Systems:

Power network analysis, Polyphase circuits, Transients, Transmission Lines, Losses.

IV. Costing, Accounting and Budgeting:

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

V. Project Management:

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

VI. Inventory Management:

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

VII. Quality Management Systems:

QA modles. 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.	Electrical Technology	B.L. Tharaja
2.	Electronic Devices and Circuits.	Bogart
3.	DC Machines	P.C. Sen
4.	Handbook of Engineering Management	Dennis Lock.
5.	Total Quality Management	Dale H. Besterfield, Carol Besterfield-Michna, Glen H. Besterfield, Mary Gesterfield-Sacre