

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. 04/2018

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications for Posts	Test Specification	Topics of Syllabi
1.	62/2018	Professional Social Worker (BS-17), Anti Narcotics Force, Ministry of Narcotics Control.	i. Second Class or Grade 'C' Master's Degree in Social Work/ Sociology/ Psychology/ Anthropology. ii. Three (3) 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"> • Community Organization and Development, • Social Research & Statistics, • Organizational Behaviour and Human Resources, • Social Welfare Policy and Administration, • Criminology and its Remedial Measures, • Methods of Counselling & Guidance Services • Environmental Sociology • Health Policy of the Government
2.	63/2018	Psychologist (BS-17), Anti Narcotics Force, Ministry of Narcotics Control.	i. Second Class or Grade 'C' Master's Degree in Psychology. ii. Three (3) 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"> • Nature and Scope of Psychology • Biological Basis of Behaviour • Sensation and Perception • Learning and Memory • Motivation and Emotion • Psychological Assessment • Personality & Intelligence traits • Counseling and psychotherapy • Social Influence and Group Dynamics • Developmental Psychology • Abnormal and Clinical Psychology • Health Psychology
3.	72/2018	Physical Training Instructor (Senior) (Male) (BS-16), Islamabad Model Schools & Colleges for Boys, Federal Directorate of Education, Capital Administration and Development Division.	Second Class or Grade 'C' B.A/B.Sc. with one year Senior Diploma in Physical Education. OR Second Class or Grade 'C' Bachelor Degree in Physical Education.	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"> • Organization & Administration of Physical Education • Measurement & Evaluation in Physical Education • Psychology in Physical Education • Sports rules: Games and Athletics • Athletic Injury • Sports Organizations

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications for Posts	Test Specification	Topics of Syllabi
4.	74/2018	Surveyor/ Drawing Officer (BS-16 plus 25% special pay), Minerals & Industries Department, Gilgit Baltistan, Ministry of Kashmir Affairs and Gilgit Baltistan.	i. Three (3) years diploma in Associate Engineering in Mining and Land Survey Technology. ii. One (1) year Survey Certificate from Survey of Pakistan.	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"> • Introduction to Mining • Mine Ventilation • Mine Management, Economics and Legislations • Rescue & Safety • Explosives and Blasting • Surveying • Survey Instruments and their uses • Field Astronomy and Curves • Basics of Photogrammetry • Elementary Drawing • Quantity Survey • Civil Drafting
5.	75/2018	Assistant Director Industries (BS-17 plus 25% special pay), Minerals & Industries Department, Gilgit Baltistan, Ministry of Kashmir Affairs and Gilgit Baltistan.	i. Second Class or Grade 'C' Master's degree in Social Science/ Economics/ MBA/ MPA or equivalent from a University recognized by HEC. ii. Two (2) years post qualification experience in the field of Industries.	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"> • Organizational Management • Human Resource Management • Personnel Management • Financial Management • Report Writing • Latest Industrial Policy of Pakistan
6.	81/2018	Inspector (BS-16), Pakistan Railways Police, Ministry of Railways.	Second Class or Grade 'C' Bachelor's degree from a University recognized by HEC.	Objective Type Test (MCQ) Part-I English = 20 marks Part-II General Intelligence Test = 80 marks	Part-I Grammar Usage, Sentence Structuring. Part-II <ul style="list-style-type: none"> • Basic Arithmetic. • Current Affairs. • Pakistan Affairs & Islamic Studies • Everyday/General Science Note : (Equal weightage for each topic at Part-II)

S. No	Case No. F.4-	Particulars of Post(s)	Qualifications for Posts	Test Specification	Topics of Syllabi
7.	82/2018	Pharmacist (BS-17), Pakistan Navy, Ministry of Defence (Defence Division).	Second Class or Grade 'C' Bachelor's degree in Pharmacy.	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"> • Physical Pharmacy, • Clinical Pharmacy, • Industrial Pharmacy, • Hospital Pharmacy, • Pharmaceutics Chemistry, • Pharmaceutical Biochemistry, • Pharmaceutical Microbiology, • Pharmaceutical Quality Control & Quality Management, • Application of Computer in Pharmacy.
8.	84/2018	Computer Programmer/ GSO-iii (Civilian) (BS-17), Ministry of Defence (Defence Division).	Second Class or Grade 'C' Master's degree in Computer Science/ Information Technology or equivalent from a University recognized by the Higher Education Commission OR Second Class or Grade 'C' Bachelor's degree in Software Engineering/ Computer Engineering or equivalent from a University recognized by the Higher Education Commission.	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"> • Silver polygon and its impact on GIS • Digital analysis and 3D modelling for urban planning, and Land using GIS and Remote Sensing Techniques • Vector data vs Raster data • Computer Languages (Python, .Net Java Script, PHP) • Methodology of web based application using PG-Routing • Methodology for tilting of satellite images in standalone application. • Mapping of flood affected areas and damage assessment using remote sensing • Difference in geo referencing and rectification. • Spectral behavior of vegetation, soil and water. • Digital diagram techniques (Union and Intersection)

Schemes and Syllabi for Written Examination (Descriptive) for All Posts in BS-18 & BS-19 included in Consolidated Advertisement No. 04/2018

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.4-35/2018-R
Particulars of post	District Attorney (BS-18 plus 25% special pay), Law & Prosecution Department, Gilgit Baltistan, Ministry of Kashmir Affairs and Gilgit Baltistan.
Minimum Qualification & Experience:	<ul style="list-style-type: none"> i. Second Class or Grade 'C' Master's degree in Law or equivalent qualification from a University/ College recognized by HEC. ii. Five (5) years post qualification experience in Legal/ Judicial matters.

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 Panel Code, 1860
- v. Qanun-e-Shahdat Order, 1984
- vi. Criminal Procedure Code, 1898

SUGGESTED READINGS

S.No.	Title	Author
1.	Pakistan Panel Code, 1860	M. Mahmood
2.	Criminal Procedure Code, 1898	Shaukat Mahmood
3.	Law of Evidence	Justice (R) Khalid ur Rahman Khan as adapted form Principles and Digest of the Law of Evidence by M. Monir
4.	Qanun-e-Shahdat Order, 1984	
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: PROFESSIONAL**Max Marks: 100****Time Allowed: 3 Hours**

Case No.	F.4-61/2018-R
Particulars of post	Joint Census Commissioner (Geography) (BS-19), Pakistan Bureau of Statistics, Statistics Division, Ministry of Finance, Revenue, Economic Affairs, Privatization & Statistics.
Minimum Qualification & Experience:	Second Class or Grade 'C' Master's Degree in Geography with twelve (12) years post qualification experience in the field of Geographic/ Cartographic work and delineation work.

Part-I: 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

Part-II: 50 Marks

(Geography)

- I. Geographic patterns of culture, Classification of Languages, Ethnic Conflicts, Factors of Ethnic Cleansing, Ethnic Cleansing in the World, Development Indicators, Economic Indicators, Social Indicators, Health Indicators, Development through Trade, Impacts of development Indicators.
- II. Factors effecting Agriculture, Subsistence Agriculture and population growth, Commercial Agriculture and Market Forces, Sustainable Agriculture, Types and Distribution of Agriculture, Factors of Industrial locations, Distribution of Industries and

Industrial Estates, Renewable Resources, Recycling Resources, Sustainable resources.

- III. Factors of Population Growth, Components of Change, Population Structure, The Demographic Transition, Over and under Population threats and their consequences.
- IV. Politics, Geography and Political Geography, State as a Politico-Territorial Phenomenon, State, Nation and the Nation-State, Global patterns in health and diseases, Models in medical geography, Recent issues and developments.

SUGGESTED READINGS

S. No.	Title	Author
1.	Human Resource Management	H.T.Graham & Roger Bennett
2.	Management	James A.F.Stoner, R.Eward Freeman, Daniel R.Gilbert Jr.
3.	Understanding Computer: Today and Tomorrow	Deborah Morley, Charles Parker
4.	MS Office 365 Handbook: 2013 Edition	Kevin Wilson
5.	Text Book of Population Geography,	Dr. Martin Ardagh (2013).
6.	Tourism Geography	Shweta Singh (2013).
7.	Natural Disaster Management: New technologies and opportunities,	Subir Ghosh (2012).
8.	Population Geography	Clarke, J. I. (1965).
9.	Human Geography Cultural Society and Space.	De Blij. H. J. (2003).
10.	Political Geography: The Spatiality of Politics.	Dikshit, R. D. (2001).
11.	Human Geography Landscape of Human Activities.	Getis, Fellman. (2005).
12.	An Introduction to Agricultural Geography. London: Hutchinson.	Grigg, D. (1984).

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

Case No.	F.4-66/2018-R
Particulars of post	Programme Manager (BS-18), Anti Narcotics Force, Ministry of Narcotics Control.
Minimum Qualification & Experience:	i. MBBS or equivalent qualification recognized by PMDC. ii. Registration with PMDC. iii. Postgraduate Higher/ Lower Diploma in Public Health/ Health Services Administration/ Primary Health Care, with three/ five year post qualification experience in Drug Addict/ Treatment & Rehabilitation Centre, respectively. OR i. Second Class or Grade 'C' Master's degree in Social Work/ Sociology/ Psychology/ Anthropology. ii. Five (5) years post qualification experience in Drug Addict Treatment/ Rehabilitation Centre.

For Medical Professional

(having MBBS degree and Lower/Higher diploma in Public Health/ Health Services Administration/ Primary Health Care.)

Part-I: (Qualification Based)**50 Marks**Core courses of **MBBS Degree****Part-II: (Professional)****50 Marks**Core courses of Post Graduate Lower Diploma in **Public Health/ Health Services Administration/ Primary Health Care****For General Side**

(having Master's degree in Social Work/ Sociology/ Psychology/ Anthropology.)

Professional: 100 Marks

I. General Sociology

- Society:** Meaning and characteristics. Community; meaning and characteristics. Individual and society. Relationship between individual and society.
- Social Control:** Mechanisms of social control-formal and informal means of social control, Anomie, Alienation and social Integration-Means of social integration in Pakistani Society.
- Social Problems in Pakistan:** High population growth rate, Rural –urban migration. Deviance and street crime, Unemployment, illiteracy and School dropout, Smuggling, Prostitution, Poverty, Drug Addiction, Child Labour and Abuse, Bonded

Labour, Social customs and Traditions affecting Women in Pakistan, Violence Against Women and Domestic Violence, Issues concerning the Elderly in Pakistan.

- II. **Anthropology:** Definition of anthropology, its historical development and recent trends
- III. **Contemporary Human Problems:** Poverty, social inequality, political instability, population problems, ethnic violence and terrorism etc.
- IV. **Socio-Cultural Change:** Dimension of cultural change, barriers to cultural change including (culture, psychological and political), internal dynamics for change, external dynamics for change, media and cultural change, dynamics of change in Pakistan (Trends and prospects)
- V. **Psychological Assessment:** Attributes of Psychological Measures, Validity, Reliability, Item Analysis, Norms, Modern Test Theory, Selection and Training, Educational and Clinical Assessment, Ethical and Legal Issues in Assessment.
- VI. **Sensation and Perception:** Sensory process, Perception, Gestalt Principles, Binocular and Monocular cues, Illusions and Extra Sensory Perception, Determinants of Perception
- VII. **Motivation and Emotion:** Homeostasis, Factors affecting Motivation, Biogenic and Social Motives, Measurement of Human Motivation, Theories of Motivation, Emotions, Types of Emotions, Physiological changes in Emotion, Theories of Emotions.
- VIII. **Forensic Psychology:** Psychology and Law, Investigation, Confession, Eyewitness Testimony, Working with Offenders, Juvenile Delinquents, Drug Addicts etc.

SUGGESTED READINGS

S. No.	Title	Author
1.	Poverty Curtains	Dr. Mehboob-ul-haq
2.	Sociology	Ogburn & Nimkoff
3.	Pakistani Society	Akbar Ahmad, S.
4.	Anthropology and Modern life	Franz Boas
5.	Anthropology and Contemporary Human Problem	John H. Bodley
6.	Introduction to Psychology	Atkinson & Hilgard's, Fredrickson, B
7.	Social Psychology	Baron, R. A
8.	Forensic Psychology	Fulero, S. M., & Wrightsman
9.	Psychology: Concepts and Connections	Rathus, S.

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

Case No.	F.4-83/2018-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.4-85/2018-R
Particulars of post	Deputy Director (Legal) (BS-18), Policy Wing, Ministry of Energy (Petroleum Division).
Minimum Qualification & Experience:	<ul style="list-style-type: none"> i. Second Class or Grade 'C' Bachelor's degree in Law or equivalent. ii. Five (5) years post qualification experience in BS-17 or equivalent in the field of law of petroleum sector.

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 Panel Code, 1860
 - v. Qanun-e-Shahdat Order, 1984
 - vi. Criminal Procedure Code, 1898
- III. Legal Terminologies

SUGGESTED READINGS

S. No.	Title	Author
1.	Pakistan Panel Code, 1860	M. Mahmood
2.	Criminal Procedure Code, 1898	Shaukat Mahmood
3.	Law of Evidence	Justice (R) Khalid ur Rahman Khan as adapted from Principles and Digest of the Law of Evidence by M. Monir
4.	Qanun-e-Shahdat Order, 1984	
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.4-86/2018-R
Particulars of post	Associate Professor (Mathematics) (BS-19), Federal College of Education, Capital Administration and Development Division.
Minimum Qualification & Experience:	Second Class or Grade 'C' Master's Degree in Mathematics with Twelve (12) years post qualification teaching/ administrative experience at College/ University level.

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

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

II. Statics

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

III. Dynamics

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

IV. Ordinary differential equations

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

V. Fourier series and partial differential equations

- Trigonometric Fourier series; sine and cosine series; Bessel inequality; summation of infinite series; convergence of the Fourier series.
- Partial differential equations of first order; classification of partial differential equations of second order; boundary value problems; solution by the method of separation of variables; problems associated with Laplace equation, wave equation and the heat equation in Cartesian coordinates.

VI. Numerical Methods

- Solution of nonlinear equations by bisection, secant and Newton-Raphson methods; the fixed- point iterative method; order of convergence of a method.
- Solution of a system of linear equations; diagonally dominant systems; the Jacobi and Gauss-Seidel methods.

- Numerical solution of an ordinary differential equation; Euler and modified Euler methods; Runge- Kutta methods.

Part-II: (Professional)

50 Marks

I. Development of Curriculum and Instructional Material

- Elements of Curriculum.
- 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.4-88/2018-R
Particulars of post	Senior Physiotherapist (Female) (BS-18), Armed Forces Institute of Rehabilitation Medicine, Ministry of Defence.
Minimum Qualification & Experience:	<ul style="list-style-type: none"> i. Five (5) years DPT in Physiotherapy from a University recognized by HEC. ii. Five (5) years post qualification experience as Physiotherapist in Govt. Organization.

Professional: 100 Marks**I. Biomechanics and Ergonomics**

Biomechanics: basic terminology, Kinematic concepts for analyzing human motion, Biomechanics of tissues and structures of the musculoskeletal system, Biomechanics of the human upper and lower extremity,

Ergonomics: knowledge, tools, and techniques

II. Exercise Physiology

Control of internal environment, Hormonal responses to exercise, Measurement of work, power & energy expenditure, Circulatory responses to exercise, Respiration during exercise, Temperature regulation, The physiology of training: effect on vo₂ max, performance, homeostasis and strength, Work tests to evaluate cardio respiratory fitness, Exercise prescription for health and fitness, Exercise for special populations, Physiology of performance factors affecting performance

III. Musculoskeletal Physical Therapy

Medical terminology regarding musculoskeletal system, principles and concepts of musculoskeletal evaluation & assessment, Soft tissue injury, repair, and management, Joint, connective tissue, and bone disorders and management, Surgical interventions and postoperative management, Exercise interventions by body region, Management guidelines based on impairments, The spine: exercise interventions, The shoulder and shoulder girdle, The elbow & forearm complex, The wrist & hand, The knee, The ankle & foot

IV. Neurological Physical Therapy

Applied anatomy and physiology of the nervous system, Neurological examination, Interventions, Neurological dysfunctions, Peripheral nerve disorders and management

V. Prosthetics & Orthotics

Prosthetics: Early Management, Rehabilitation of adults with lower and upper-limb amputations

Orthotics: Introduction to orthotics, Foot Orthoses, Ankle foot Orthoses, Knee ankle foot Orthoses and knee Orthoses, Orthoses for paraplegia and hip disorders, Evaluation procedures for lower limb Orthoses, Trunk and cervical Orthoses, Upper limb Orthoses, Orthoses for burns and other soft tissue disorders, Goal setting and treatment plan

VI. Sports Physical Therapy

Introduction to sports rehabilitation, Injury screening and assessment of performance, Pathophysiology of musculoskeletal injuries, Effective clinical decision making, Joint specific sport injuries and pathologies, Travelling with a team drugs and the athlete ethics and sports medicine case histories

SUGGESTED READINGS

S. No.	Title	Author
1.	Basic Biomechanics,	Susan J. Hall
2.	Ergonomics for the therapist	Karen Jacobs
3.	Exercise Physiology- Theory and Application to Fitness and Performance	Scott K. Powers, Edward T. Howley.
4.	Therapeutics Exercises and Technique,	Carolyn Kisner & Lynn Allen Colby
5.	Therapeutics Exercises: Techniques for Intervention	William D. Bandy.
6.	Neurological Physiotherapy A problem-solving approach	Susan Edwards
7.	Prosthetics and Patient Management: A Comprehensive Clinical Approach	Kevin Carroll; Joan Edelstein.
8.	Orthotics a comprehensive clinical approach	Joan E Edelstein & Jan Bruckner.
9.	Sports Rehabilitation and Injury Prevention	Paul Comfort & Earle Abrahamson
10.	Clinical Sports Medicine	Bruckner & Khan.