Syllabus for Informatics Officer Examination, 2018 under Information & Communication Technology Department

SUBJECTS

1. General English Paper- I ..... 100 Marks
2. General English Paper- II *(Objective Type)* ..... 100 Marks
3. Technical Paper- I *(Objective Type)* ..... 200 Marks
4. Technical Paper- II *(Objective Type)* ..... 200 Marks
5. Technical Paper - III *(Objective Type)* ..... 200 Marks

(A) Technical ..... 150 Marks
(B) Aptitude Test.. ..... 50 Marks

General English Paper - I (3 hours duration)

ESSAY TYPE

(Full Marks : 100)

(a) Essay Writing ..... 25 Marks
(b) Précis Writing ..... 15 Marks
(c) Letter Writing ..... 15 Marks
(d) Idioms & Phrases ..... 14 Marks
(e) Expansion of passages ..... 15 Marks
(f) Comprehension of given passages ..... 16 Marks

General English Paper - II (*2 hours duration*)

OBJECTIVE TYPE (MCQ)

(Full Marks : 100)

(a) Grammar : ..... 40 Marks

Parts of Speech, Nouns, Adjective, Verb, Adverb, Preposition, etc.

(b) Composition ....30 Marks

i) Analysis of complex and compound sentences
ii) Transformation of sentences
iii) Synthesis of sentences

(c) Correct usage and vocabularies ..... 30 Marks

Technical Paper - I (200)

(Information Technology and Communication)

1. **Hardware &Networking Technologies (40 Marks)**
   - 1.1. Basic Computer System
   - 1.2. Basic Networking
   - 1.3. Network Devices - Switches, Router, Firewall, etc.
   - 1.4. TCP/IP
   - 1.5. IOS and Security Device Manager
   - 1.6. IP Routing
   - 1.7. Spanning Tree Protocol
   - 1.8. Security
   - 1.9. Wireless Technologies
   - 1.10. Wide Area Networks
   - 1.11. Internetworking
   - 1.12. Sub-netting
   - 1.13. Managing a Cisco Internetwork
   - 1.14. EIGRP and OSPF
   - 1.15. Virtual LANs
   - 1.16. Network Address Translation
   - 1.17. IPv6
2. **Software Engineering (40 Marks)**
   - 2.1. Software Development Approach
     - Continuous Integration model
     - Iterative Development model
     - Incremental Development model
     - Prototyping model;
     - Rapid Application Development model
   - 2.2. Software Development Life Cycle Methodologies
     - Waterfall model
     - Iterative model
     - Spiral model
     - V-shaped model
     - Agile model
   - 2.3. Software Design Principles:
     - Introduction
     - System Models: Data-flow models, Semantic data models, Object models, Inheritance models, Object aggregation, Service usage models, Data Dictionaries

- Software Design: The design process, Design Methods, Design description, Design strategies, Design quality
- Architectural Design: System structuring, The repository model, The client-server model, The abstract machine model, Control models, Modular decomposition, Domain-specific architectures

2.4. Object Oriented Analysis and Design

- Overview of Object Oriented Systems Development:
- Object Oriented Systems Development Life Cycle:
- Object Oriented Methodologies:
- Unified Modelling Languages (UML)
- Object Oriented Analysis – Identifying Use-Cases:
- Object Analysis: Classification:
- Object Oriented Analysis – Identifying Relationships, Attributes, and Methods:
- Object Oriented Design Process and Design Axioms:
- Designing Classes:
- Access Layer:
- View Layer:

2.5. Agile Software Development

- Lifecycle
- Methods
- Adaptive Software Development (ASD)
- Dynamic System Development Method (DSDM)
- SCRUM
- Extreme Programming (XP)

2.6. Configuration Management:

- Introduction;
- Change Management;
- Version and Release Management: Version identification, Release management, Version management tools;
- Software Maintenance;
- The maintenance process, System documentation, Maintenance costs, Maintainability measurement;
- Software Reengineering;
- Software Refactoring,

3. **.NET Technologies (30 Marks)**

3.1. Basic .NET Framework

3.2. Object-Oriented Programming

3.3. ADO.NET

3.4. Dynamic Programming

3.5. ASP.NET

3.6. Windows Workflow Foundation

3.7. Application Deployment

3.8. Remoting, Web Services and WCF

3.9. .NET Programming Concepts

3.10. Windows Controls

3.11. Language-Integrated Query (LINQ)

3.12. XML

3.13. Web Services

3.14. ASP.NET AJAX

3.15. .NET Assemblies

3.16. WPF and Silverlight

3.17. LINQ and Equity Framework

3.18. Design Pattern and UML

3.19. Ajax

3.20. Reports

3.21. Threading

3.22. .NET Interoperability

4. **Java / J2EE (30 Marks)**

4.1. OOPS and Core Java

4.2. Threading

4.3. JDBC

4.4. Servlet and JSP

4.5. EJB – Enterprise Java Beans

4.6. Struts

4.7. XML and Web Services

4.8. Internationalization

4.9. JNI – Java Native Interface

5. **Database Management System (30 Marks)**

5.1. Introduction to Database

5.2. The Relational Model and Normalization

5.3. Data Modeling with ER Model

5.4. SQL for Database Construction

5.5. Managing Multiuser Databases

5.6. XML and ADO.NET

5.7. Database Processing for BIS

5.8. The Database Development Process

5.9. ER Model and Business Rules

5.10. Physical Database Design

5.11. The Client-Server Database

5.12. Data Warehousing

5.13. Distributed Databases

5.14. Object-Oriented Database

5.15. Introduction to SQL

5.16. Database Design Using Normalization

5.17. Data Models into Database Designs

5.18. Database Redesign

5.19. Managing Databases

5.20. ODBC, OLE DB, ADO, and ASP

5.21. JDBC, Java Server Pages, and MySQL

5.22. The Database Environment

5.23. Modeling Data in the Organization

5.24. Logical Database Design

5.25. Advanced SQL

5.26. The Internet Database Environment

5.27. Data and Database Administration

5.28. Object-Oriented Data Modeling

6. **Software Testing (30 Marks)**

6.1. Software Testing Techniques:

- Introduction;
- Software Testing Fundamental;
- Testing Principles;
- White Box Testing;
- Control Structure Testing;
- Black Box Testing;
- Boundary Value Analysis;
- Testing GUIs;
- Testing Documentation and Help Facilities.

6.2. Software Testing Assurance:

- Introduction;
- Verification and Validation: Validation Testing, Validation Test Criteria;
- Test Plan: Test Documentation;
- Test Strategies: Top-Down Testing, Bottom-Up Testing, Thread testing, Stress testing, Back-to-back testing;
- Principles of Testing;
- Testing methods and tools: Testing through reviews, Black-box testing (Functional testing), White box testing (glass-box testing), Testing software changes;
- Additional requirements in testing OO Systems;
- System Testing;

- Acceptance Testing;
- Regression testing;
- Metrics Collection, Computation, and Evaluation;
- Test and QA plan;
- Managing Testing Functions.

6.3. Software Testing Strategies:

- Introduction;
- Organizing for software testing;
- Software Testing Strategy;
- Unit Testing: Unit Test Considerations;
- Top-down Integration;
- Bottom-up Integration.

6.4. Six Sigma

6.5. Automated Testing

6.6. CMMI

6.7. Metrics

6.8. Testing Estimation

Technical Paper - II (200)

(E-GOVERNANCE)

1. Understanding Government and Governance (10 Marks)

1.1. Introduction to Government and Governance

1.2. Defining Good Governance

1.3. Service delivery, time taken to deliver service, cost of getting service, customer experience, complexity, transparency, etc.

1.4. Introduction to Governance - Self-preservation, supervision & resolution of conflicts, socio-economic development, regulation of the economy, provision of goods and services, etc.

1.5. Citizen Centric Administration

1.6. Perception about Governance in India

1.7. Necessary pre-conditions for Good Governance

1.8. Need for Governance Reform and Citizen Charter - Basic concept, origin and principles; problems faced in implementing the charters; Charter criteria; rationale of Citizen's charter; Designing and implementing effective complaints handling systems; etc.

2. E-Governance Project Development (15 Marks)

2.1. Introduction to e-Government and e-Governance

2.2. Challenges in current environment

2.3. Some key factors contributing to current environment

2.4. Need for a more robust approach for E-Governance

2.5. Essential elements of E-Governance Project

2.6. E-Governance project life cycle

2.7. E-Governance strategy development

2.8. Current state assessment

2.9. Define future state (to-be definition)

2.10. Implementation approach and sourcing

2.11. Develop and implement IT system

2.12. Operate and sustain

2.13. Project management office/unit

2.14. Change management and communication

3. e-Governance vision & Strategy development (10 Marks)

3.1. Understanding e-Governance strategy

3.2. Key elements in e-Governance strategy

3.3. e-Governance vision

3.4. e-Governance objectives

3.5. Identifying stakeholders and services

3.6. Categories of Government services (G2C, G2B, G2E, G2G)

3.7. Delivery channel

3.8. Implementation approach and plan (Big bang, Phased rollout, Parallel adoption, Pilot and rollout)

3.9. Programme management framework

4. Government Process Re-engineering (GPR) (15 Marks)

4.1. Objectives

4.2. Service Prioritization

4.3. Benefit of service prioritization

4.4. E-Governance and traditional approach to e-Governance

4.5. Symptoms of Poor Governance

4.6. GPR and Quality initiatives

5. Procurement in E-Governance (10 Marks)

5.1. Objectives

5.2. Introduction to Government Procurement

5.3. Procurement in e-Governance projects

5.4. Deciding on procurement strategy

5.5. Planning the procurement

5.6. Request for proposal (RFP)

5.7. Some considerations for commercial bid formats

5.8. In case of PPP/transaction fee based model

6. Business Models and Public Private Partnership (PPP) (20 Marks)

6.1. Business Models for implementation of e-Governance

6.2. Costs in e-Governance projects

6.3. Revenue opportunities in e-Governance projects

6.4. Approach for development of Business Model

6.5. Net Present Value (NPV) and Internal Rate of Return (IRR)

6.6. Public Finance and Private Finance

6.7. Rationale for PPP

6.8. PPP benefit to Citizens

6.9. PPP benefit to Government

6.10. Benefits to Private sector partner

6.11. Key design principle for PPP

6.12. Role of various partners

6.13. Role of Government in PPP

6.14. Role of Private partner

6.15. Management Contract

6.16. ASP Model - Application Service Provider Model

6.17. A requirement to launch the services in a short time frame

6.18. BOOT - Build Own Operate and Transfer Model

6.19. BOO - Build Own Operate Model

6.20. JV Model

6.21. How to structure and implement PPP

7. Digital India (20 Marks)

7.1. Digital India = the Umbrella Programme

7.2. Key Vision Areas

7.3. Participation in digital & financial space through mobiles and Banking

7.4. Easy access to a Common Service Centre

7.5. Shareable private space on a public cloud

7.6. Safe and secure Cyber-space

7.7. Government and Service on demand

7.8. Seamlessly integrated across departments or jurisdictions

7.9. Service available in real time from online & mobile platform

7.10. All citizen entitlements to be available on the cloud

7.11. Digital transformed for improving Ease of Doing Business

7.12. Making financial transaction electronics and cashless

7.13. Leveraging GIS for decision support system & development

7.14. Digital empowerment of Citizen

7.15. Universal Digital Literacy

7.16. Universal Accessible Digital Resources

7.17. Nine pillars of Digital India

7.18. e-Governance related Policies

7.19. Digital Lockers and e-Sign

8. Data Digitization (5 Marks)

9. Enterprise Architecture and Service Oriented Architecture (5 Marks)

10. Information Security Management in e-Governance Projects (15 Marks)

10.1. Information Security Threats

10.2. Improving Information Security in e-Governance

10.3. Security Policy

10.4. Security Practices and procedures

10.5. Information Security Technology and Operational

10.6. Cryptography

10.7. Firewall

10.8. Analysis tools

10.9. Monitoring Tools

10.10. Information Security Assurance Framework

10.11. Selection of Baseline Security Controls

10.12. Security Attributes

10.13. Impact of Organization due to Breaches of Information Security

10.14. Impact on Individual due to Breaches of Information Security

10.15. Security Control organization and structure

10.16. Information Security Risk Management Process

10.17. Information Security Risk Treatment

11. IT Audit of E-Governance Projects (5 Marks)

12. Understanding e-Governance Applications (10 Marks)

12.1. Key characteristics of E-Governance Applications development projects

12.2. Investment needed in e-Governance Applications

12.3. Understanding custom development vs COTS Models

12.4. Understanding Licensing Models for Application and System Software

12.5. Understanding Source Code Ownership and IPR

12.6. Revenue general options in E-Governance Applications

12.7. Strategic consideration in an e-Governance application

12.8. Business model for e-Governance applications

13. Free and Open source Software (FOSS) (5 Marks)

13.1. Understanding Open Source

13.2. Defining Open Source

13.3. Typical concerned about open source software

13.4. Open Source Software in E-Governance

14. Change Management and Capacity Building in e-Governance Projects (20 marks)

14.1. Introduction and Objectives of Management Change

14.2. ADKAR Model for Change Management

14.3. Key Principles for Change Management Design

14.4. Organizational dimension of change

14.5. People dimension of change

14.6. Communication in change management

14.7. Key reasons for failures in change initiatives

14.8. Approach for change management

14.9. Guiding principles for change planning

14.10. General tools in change management

14.11. Understanding scope of change in an e-Governance project

14.12. Identify enablers and disablers to change

14.13. Build a change champion network

14.14. Role of a change champion

14.15. Overview of approach for training in e-Governance projects

14.16. Training needs Assessment

14.17. Communications Management

15. Legal and Policy Framework for e-Governance Implementation (15 marks)

15.1. Legal aspect of e-Commerce and e-Governance

15.2. Legal and regulatory framework in India

15.3. Recognition of electronic records

15.4. IT Act Amendments, 2008

15.5. Introduction to Digital Signature

15.6. PKI Based Digital Signature basics

15.7. PKI Infrastructure

15.8. Electronic Signatures - IT Act Amendments

15.9. Cyber Crime provisions in IT Act (section 43, 47, 65, 66, 67, 73)

15.10. Indian Penal code (Sec 503, 499, 500, 463, 470, 472, 420, 416, 417, 463, 383, 405, 406, 408, 409, 204, 477, 193, 167,172,173,175) & Indian Evidence Act

15.11. Intellectual Property related Laws (Copyrights Act 1957, Patents Act 1970, Trademark Act 1999)

15.12. Other legal Aspects

15.13. Regulatory Framework under NeGP

15.14. National Policy on Open Source

16. Preparation of Detailed Project Report (DPR) and Request for Proposal (RFP) (5 Marks)

17. Contract Management Aspect (5 Marks)

17.1. Importance of contracts in E-Governance projects

17.2. Key components of E-Governance Contracts

17.3. Common terms of contract

17.4. Project type specific aspect of contracts

- Contract aspect of Software Development
- Contract aspect of IT infrastructure projects
- Contract aspect of PPP and Service delivery projects

17.5. SLA and Service Level Management

18. Monitoring and Evaluation of e-Governance project (5 Marks)

18.1. Difference between outputs and outcomes

18.2. Difference between Monitoring and Evaluation

18.3. Understanding evaluation types

18.4. Approach for Development of Monitoring and Evaluation Framework

19. Impact Assessment of e-Governance project (5 marks)

Technical Paper – III (200)

(Project Management)

1. Introduction to Project Management (10 Marks)

1.1. What is Project and Project Management?

1.2. Relationships among portfolio management, program management, project management, and organizational project management

1.3. Role of project manager

1.4. Project management office/unit

2. Organizational Influences and Project Life Cycle (10 Marks)

2.1. Organization influences on Project Management

2.2. Project Stakeholder and Governance

2.3. Project Team

2.4. Project Life cycle

3. Project Management Processes (10 Marks)

3.1. Common Project Management Process Interactions

3.2. Project Management Process Groups

3.3. Initiating Process Group

3.4. Planning Process Group

3.5. Executing Process Group

3.6. Monitoring and Controlling Process Group

3.7. Closing Process Group

3.8. Project Information

3.9. Role of the Knowledge Areas

4. Project Integration Management (15 Marks)

4.1. Develop Project Charter

- Develop Project Charter: Inputs
- Develop Project Charter: Tools and Techniques
- Develop Project Charter: Outputs

4.2. Development Project Management Plan

- Development Project Management Plan: Inputs
- Development Project Management Plan: Tools and Techniques
- Development Project Management Plan: Outputs

4.3. Direct and Manage Project Work

- Direct and Manage Project Work: Inputs
- Direct and Manage Project Work: Tools and Techniques
- Direct and Manage Project Work: Outputs
- Monitor and Control Project Work
- Monitor and Control Project Work: Inputs

- Monitor and Control Project Work: Tools and Techniques
- Monitor and Control Project Work: Outputs

4.4. Perform Integrated Change Control

- Perform Integrated Change Control: Inputs
- Perform Integrated Change Control: Tools and Techniques
- Perform Integrated Change Control: Outputs

4.5. Close Project or Phase

- Close Project or Phase: Inputs
- Close Project or Phase: Tools and Techniques
- Close Project or Phase: Outputs

5 Project Scope Management (15 Marks)

5.1. Plan Scope Management

- Plan Scope Management: Inputs
- Plan Scope Management: Tools and Techniques
- Plan Scope Management: Outputs

5.2. Collect Requirements

- Collect Requirements: Inputs
- Collect Requirements: Tools and Techniques
- Collect Requirements: Outputs

5.3. Define Scope

- Define Scope: Inputs
- Define Scope: Tools and Techniques
- Define Scope: Outputs

5.4. Create WBS

- Create WBS: Inputs
- Create WBS: Tools and Techniques
- Create WBS: Outputs

5.5. Validate Scope

- Validate Scope: Inputs
- Validate Scope: Tools and Techniques
- Validate Scope: Outputs

5.6. Control Scope

- Control Scope: Inputs
- Control Scope: Tools and Techniques
- Control Scope: Outputs

6 Project Time Management (15 Marks)

6.1. Plan Schedule Management

- Plan Schedule Management: Inputs
- Plan Schedule Management: Tools and Techniques

- Plan Schedule Management: Outputs

6.2. Define Activities

- Define Activities: Inputs
- Define Activities: Tools and Techniques
- Define Activities: Outputs

6.3. Sequence Activities

- Sequence Activities: Inputs
- Sequence Activities: Tools and Techniques
- Sequence Activities: Outputs

6.4. Estimate Activity Resources

- Estimate Activity Resources: Inputs
- Estimate Activity Resources: Tools and Techniques
- Estimate Activity Resources: Outputs

6.5. Estimate Activity Durations

- Estimate Activity Durations: Inputs
- Estimate Activity Durations: Tools and Techniques
- Estimate Activity Durations: Outputs

6.6. Develop Schedule

- Develop Schedule: Inputs
- Develop Schedule: Tools and Techniques
- Develop Schedule: Outputs

6.7. Control Schedule

- Control Schedule: Inputs
- Control Schedule: Tools and Techniques
- Control Schedule: Outputs

7. Project Cost Management (15 Marks)

7.1. Plan Cost Management

- Plan Cost Management: Inputs
- Plan Cost Management: Tools and Techniques
- Plan Cost Management: Outputs

7.2. Estimate Costs

- Estimate Costs: Inputs
- Estimate Costs: Tools and Techniques
- Estimate Costs: Outputs

7.3. Determine Budget

- Determine Budget: Inputs
- Determine Budget: Tools and Techniques
- Determine Budget: Outputs

7.4. Control Costs

- Control Costs: Inputs
- Control Costs: Tools and Techniques
- Control Costs: Outputs

8. Project Quality Management (10 Marks)

8.1. Plan Quality Management

- Plan Quality Management: Inputs
- Plan Quality Management: Tools and Techniques
- Plan Quality Management: Outputs

8.2. Perform Quality Assurance

- Perform Quality Assurance: Inputs
- Perform Quality Assurance: Tools and Techniques
- Perform Quality Assurance: Outputs

8.3. Control Quality

- Control Quality: Inputs
- Control Quality: Tools and Techniques
- Control Quality: Outputs

9. Project Human Resource Management (10 Marks)

9.1. Plan Human Resource Management

- Plan Human Resource Management: Inputs
- Plan Human Resource Management: Tools and Techniques
- Plan Human Resource Management: Outputs

9.2. Acquire Project Team

- Acquire Project Team: Inputs
- Acquire Project Team: Tools and Techniques
- Acquire Project Team: Outputs
- Develop Project Scheme
- Develop Project Scheme: Inputs
- Develop Project Scheme: Tools and Techniques
- Develop Project Scheme: Outputs

9.3. Manage Project Team

- Manage Project Team: Inputs
- Manage Project Team: Tools and Techniques
- Manage Project Team: Outputs

10. Project Communications Management (10 Marks)

10.1. Plan Communications Management

- Plan Communications Management: Inputs
- Plan Communications Management: Tools and Techniques
- Plan Communications Management: Outputs

10.2. Manage Communications

- Manage Communications: Inputs
- Manage Communications: Tools and Techniques
- Manage Communications: Outputs

10.3. Control Communications

- Control Communications: Inputs
- Control Communications: Tools and Techniques
- Control Communications: Outputs

11. Project Risk Management (10 Marks)

11.1. Plan Risk Management

- Plan Risk Management: Inputs
- Plan Risk Management: Tools and Techniques
- Plan Risk Management: Outputs

11.2. Identify Risks

- Identify Risks: Inputs
- Identify Risks: Tools and Techniques
- Identify Risks: Outputs

11.3. Perform Qualitative Risk Analysis

- Perform Qualitative Risk Analysis: Inputs
- Perform Qualitative Risk Analysis: Tools and Techniques
- Perform Qualitative Risk Analysis: Outputs

11.4. Perform Quantitative Risk Analysis

- Perform Quantitative Risk Analysis: Inputs
- Perform Quantitative Risk Analysis: Tools and Techniques
- Perform Quantitative Risk Analysis: Outputs

11.5. Plan Risk Response

- Plan Risk Response: Inputs
- Plan Risk Response: Tools and Techniques
- Plan Risk Response: Outputs

11.6. Control Risks

- Control Risks: Inputs
- Control Risks: Tools and Techniques
- Control Risks: Outputs

12. Project Procurement Management (10 Marks)

12.1. Plan Procurement Management

- Plan Procurement Management: Inputs
- Plan Procurement Management: Tools and Techniques
- Plan Procurement Management: Outputs

12.2. Conduct Procurements

- Conduct Procurements: Inputs

- Conduct Procurements: Tools and Techniques
- Conduct Procurements: Outputs

12.3. Control Procurements

- Control Procurements: Inputs
- Control Procurements: Tools and Techniques
- Control Procurements: Outputs\

12.4. Close Procurement

- Close Procurement: Inputs
- Close Procurement: Tools and Techniques
- Close Procurement: Outputs

12.5. Close Procurements

- Close Procurements: Inputs
- Close Procurements: Tools and Techniques
- Close Procurements: Outputs

13. Project Stake Holder Management (10 Marks)

13.1. Identify Stakeholders

- Identify Stakeholders: Inputs
- Identify Stakeholders: Tools and Techniques
- Identify Stakeholders: Outputs

13.2. Plan Stakeholder Management

- Plan Stakeholder Management: Inputs
- Plan Stakeholder Management: Tools and Techniques
- Plan Stakeholder Management: Outputs

13.3. Manage Stakeholder Engagement

- Manage Stakeholder Engagement: Inputs
- Manage Stakeholder Engagement: Tools and Techniques
- Manage Stakeholder Engagement: Outputs

13.4. Control Stakeholder Engagement

- Control Stakeholder Engagement: Inputs
- Control Stakeholder Engagement: Tools and Techniques
- Control Stakeholder Engagement: Outputs

APTITUDE TEST (50 Marks)

(a) Numerical And Figurework Tests: (16 Marks)

These tests are reflections of fluency with numbers and calculations. It shows how easily a person can think with numbers. The subject will be given a series of numbers. His/Her task is to see how the numbers go together to form a relationship with each other. He/She has to choose a number which would go next in the series.

(b)**Verbal Analysis And Vocabulary Tests: (14 Marks)**

These tests measure the degree of comfort and fluency with the English language. These tests will measure how a person will reason with words. The subject will be given questions with alternative answers, that will reflect his/her command of the rule and use of English language.

(c)**Visual And Spatial/3-D Ability Tests: (10 Marks)**

These tests are used to measure perceptual speed and acuity. The subject will be shown pictures where he/she is asked to identify the odd one out; or which comes next in the sequence or explores how easily he/she can see and turn around objects in space.

(d) **Abstract Reasoning Tests: (10 Marks)**

This test measures the ability to analyse information and solve problems on a complex, thought based level. It measures a person's ability to quickly identify patterns, logical rules and trends in new data, integrate this information, and apply it to solve problems.