

■ Information Technology Engineers Examination —————

IT Passport Examination  
(Level 1)  
Syllabus

— Details of Knowledge Required for  
the Information Technology Engineers Examination —

Version 3.0

June 2015

**IPA**

INFORMATION-TECHNOLOGY PROMOTION AGENCY, JAPAN

Corporate names or product names used in this syllabus are trademarks or registered trademarks of each company.  
® and TM are not used in the syllabus.

# CONTENTS

■ INTRODUCTION .....	1
■ CONFIGURATION OF THE SYLLABUS .....	1

## ◆Strategy◆

<b>MAJOR CATEGORY 1: CORPORATE AND LEGAL AFFAIRS .....</b>	<b>3</b>
<b>MIDDLE CATEGORY 1: CORPORATE ACTIVITIES .....</b>	<b>3</b>
1. Management and organization theory .....	3
2. OR and IE .....	3
3. Accounting and financial affairs .....	4
<b>MAJOR CATEGORY 1: CORPORATE AND LEGAL AFFAIRS .....</b>	<b>6</b>
<b>MIDDLE CATEGORY 2: LEGAL AFFAIRS .....</b>	<b>6</b>
4. Intellectual property rights .....	6
5. Laws on security .....	6
6. Laws on labor and transaction .....	7
7. Other laws, guidelines, and engineer ethics .....	8
8. Standardization .....	8
<b>MAJOR CATEGORY 2: BUSINESS STRATEGY .....</b>	<b>10</b>
<b>MIDDLE CATEGORY 3: BUSINESS STRATEGY MANAGEMENT .....</b>	<b>10</b>
9. Business strategy techniques .....	10
10. Marketing .....	10
11. Business strategy and goal/evaluation .....	11
12. Business management system .....	11
<b>MAJOR CATEGORY 2: BUSINESS STRATEGY .....</b>	<b>12</b>
<b>MIDDLE CATEGORY 4: TECHNOLOGICAL STRATEGY MANAGEMENT .....</b>	<b>12</b>
13. Planning of technology development strategy and technology development plan .....	12
<b>MAJOR CATEGORY 2: BUSINESS STRATEGY .....</b>	<b>13</b>
<b>MIDDLE CATEGORY 5: BUSINESS INDUSTRY .....</b>	<b>13</b>
14. Business system .....	13
15. Engineering system .....	13
16. e-business .....	14
17. Consumer appliances and industrial devices .....	14
<b>MAJOR CATEGORY 3: SYSTEM STRATEGY .....</b>	<b>16</b>
<b>MIDDLE CATEGORY 6: SYSTEM STRATEGY .....</b>	<b>16</b>
18. Information systems strategy .....	16
19. Business process .....	16
20. Solution business .....	17
21. System utilization promotion and evaluation .....	18
<b>MAJOR CATEGORY 3: SYSTEM STRATEGY .....</b>	<b>19</b>
<b>MIDDLE CATEGORY 7: SYSTEM PLANNING .....</b>	<b>19</b>
22. Computerization planning .....	19
23. Requirements definition .....	19
24. Procurement planning and implementation .....	19
<b>MAJOR CATEGORY 4: DEVELOPMENT TECHNOLOGY .....</b>	<b>21</b>
<b>MIDDLE CATEGORY 8: SYSTEM DEVELOPMENT TECHNOLOGY .....</b>	<b>21</b>
25. System development technology .....	21
<b>MAJOR CATEGORY 4: DEVELOPMENT TECHNOLOGY .....</b>	<b>23</b>
<b>MIDDLE CATEGORY 9: SOFTWARE DEVELOPMENT MANAGEMENT TECHNIQUES .....</b>	<b>23</b>
26. Development process and methods .....	23

◆Management◆

**MAJOR CATEGORY 5: PROJECT MANAGEMENT ..... 24**  
**MIDDLE CATEGORY 10: PROJECT MANAGEMENT..... 24**  
27. Project management..... 24

**MAJOR CATEGORY 6: SERVICE MANAGEMENT ..... 25**  
**MIDDLE CATEGORY 11: SERVICE MANAGEMENT ..... 25**  
28. Service management..... 25  
29. Service support ..... 25  
30. Facility management..... 26

**MAJOR CATEGORY 6: SERVICE MANAGEMENT ..... 27**  
**MIDDLE CATEGORY 12: SYSTEM AUDIT ..... 27**  
31. System audit ..... 27  
32. Internal control ..... 27

◆Technology◆

**MAJOR CATEGORY 7: BASIC THEORY ..... 29**  
**MIDDLE CATEGORY 13: BASIC THEORY ..... 29**  
33. Discrete mathematics..... 29  
34. Applied mathematics ..... 29  
35. Theory of information..... 30

**MAJOR CATEGORY 7: BASIC THEORY ..... 31**  
**MIDDLE CATEGORY 14: ALGORITHM AND PROGRAMMING..... 31**  
36. Data structure..... 31  
37. Algorithm..... 31  
38. Programming and programming languages ..... 31  
39. Other languages ..... 32

**MAJOR CATEGORY 8: COMPUTER SYSTEM ..... 33**  
**MIDDLE CATEGORY 15: COMPUTER COMPONENT ..... 33**  
40. Processor..... 33  
41. Memory ..... 33  
42. Input/output devices..... 34

**MAJOR CATEGORY 8: COMPUTER SYSTEM..... 35**  
**MIDDLE CATEGORY 16: SYSTEM COMPONENT ..... 35**  
43. System configuration ..... 35  
44. System evaluation indexes..... 35

**MAJOR CATEGORY 8: COMPUTER SYSTEM..... 37**  
**MIDDLE CATEGORY 17: SOFTWARE ..... 37**  
45. Operating system ..... 37  
46. File system..... 37  
47. Development tools..... 38  
48. Open source software ..... 38

**MAJOR CATEGORY 8: COMPUTER SYSTEM..... 40**  
**MIDDLE CATEGORY 18: HARDWARE..... 40**  
49. Hardware (computer and I/O device) ..... 40

**MAJOR CATEGORY 9: TECHNOLOGY ELEMENT..... 41**  
**MIDDLE CATEGORY 19: HUMAN INTERFACE..... 41**  
50. Human interface technology ..... 41  
51. Interface design..... 41

**MAJOR CATEGORY 9: TECHNOLOGY ELEMENT..... 42**  
**MIDDLE CATEGORY 20: MULTIMEDIA..... 42**  
52. Multimedia technology ..... 42

53. Multimedia application.....	42
<b>MAJOR CATEGORY 9: TECHNOLOGY ELEMENT.....</b>	<b>44</b>
<b>MIDDLE CATEGORY 21: DATABASE .....</b>	<b>44</b>
54. Database architecture.....	44
55. Database design .....	44
56. Data manipulation.....	45
57. Transaction processing .....	45
<b>MAJOR CATEGORY 9: TECHNOLOGY ELEMENT.....</b>	<b>46</b>
<b>MIDDLE CATEGORY 22: NETWORK .....</b>	<b>46</b>
58. Network architecture .....	46
59. Communications protocol.....	46
60. Network application.....	46
<b>MAJOR CATEGORY 9: TECHNOLOGY ELEMENT.....</b>	<b>48</b>
<b>MIDDLE CATEGORY 23: SECURITY.....</b>	<b>48</b>
61. Information security.....	48
62. Information security management .....	48
63. Information security measures and information security implementation technology .....	49

This page is intentionally left blank.

## ■ Introduction

The syllabus (subtitled as “details of the knowledge required for the Information Technology Engineers Examination”) for the IT Passport Examination, in which “the scope of exam questions”<sup>1</sup> is described in more detail and the breadth and depth of the knowledge required for Level 1 are organized and clarified, has been defined and then published here.

It is expected that this syllabus will be used effectively as learning guidelines for examinees who aim to pass the examination, and also as instructional guidelines in the educational process within companies and schools.

Please note that the detailed information in this syllabus might be added, changed, or deleted, based on technology trends and other factors.

## ■ Configuration of the syllabus

As shown in Figure 1, this syllabus provides a set of a learning goal and a description for every item.

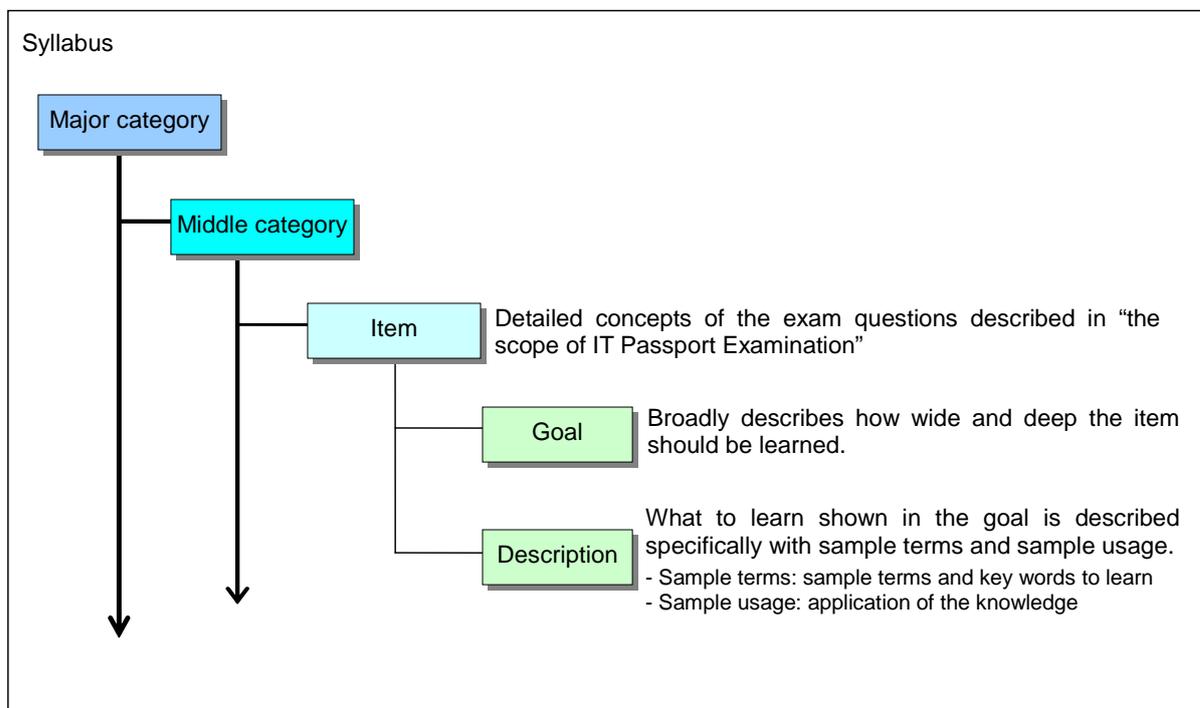


Figure 1 Configuration of the syllabus

<sup>1</sup> “Outline of IT Engineers Examination” 7. Scope on the test  
[http://www.jitec.ipa.go.jp/1\\_04hanni\\_sukiru/\\_index\\_hanni\\_skill.html](http://www.jitec.ipa.go.jp/1_04hanni_sukiru/_index_hanni_skill.html)

## ■ Revision history

### [Ver. 3.0] Jun 2015

➤ Page	➤ Change
➤ Overall	➤ Addition of sample terms and review and settlement of terms

### [Ver. 2.0] May 2012

➤ Page	➤ Change
➤ Overall	➤ Addition of sample terms and sample usage and review and settlement of terms
	➤ Deletion of sample questions

### [Ver1.1] October 27, 2008

➤ Page	➤ Change
➤ 3	➤ Addition of (4) Computer literacy
➤ 21	➤ Addition of 21. System utilization promotion and evaluation
➤ 22	➤ Addition of sample questions
➤ 23	➤ Addition of basic computerization policies as a description in (1) Computerization planning
➤ 25	➤ Addition of the term “user manual” to [Sample terms] in (e) Software acceptance
➤ 30	➤ Review of terms (The term “service level contract” was changed to “service level agreement” and the term “service level management” to another equivalent term in Japanese version.)
➤ 33	➤ Review of terms (The term “audit trail” was changed to audit evidence.)

### [Ver1.0] First edition, June 26, 2008

# Strategy

**Major category 1: Corporate and legal affairs**

**Middle category 1: Corporate activities**

## 1. Management and organization theory

### **[Goal]**

- Understand the fundamental concepts about corporate activities and business management.

### **[Description]**

- ✓ Understand the fundamental activities in companies to understand the assigned business tasks for which you may be responsible. Understand the concepts and techniques, such as PDCA, to grasp and solve the problems regarding assigned business tasks.

### **(1) Corporate activities and management resources**

Understand the fundamental concepts about corporate activities and management resources.

#### **(a) Corporate activities**

Understand the purposes of corporate activities.

**Sample terms** Management principles (corporate philosophy), shareholder meeting, closing account, CSR (Corporate Social Responsibility), disclosure, audit, green IT

#### **(b) Management resources**

Understand the meaning and need for management of people, materials, money, and information in business management.

**Sample terms** stakeholder, corporate brand, work life balance, diversity, OJT, Off-JT, coaching, mentoring, CDP (Career Development Program), mental health

### **(2) Business management**

Understand the fundamental concepts of business management.

**Sample terms** business objectives; financial affairs, property, human resources, information management; PDCA (Plan, Do, Check, and Act), BCP (Business Continuity Plan), BCM (Business Continuity Management), risk assessment, MBO (Management By Objectives), HRM (Human Resource Management), talent management

### **(3) Management organization**

Understand fundamental management organizations.

**Sample terms** hierarchical organization, divisional organization, functional organizations, matrix organization, company system, project organization, in-house company, CEO (Chief Executive Officer), CIO (Chief Information Officer)

## 2. OR and IE

### **[Goal]**

- Analyze familiar business tasks, and understand and utilize typical techniques for solving problems.
- Understand practical methods of how to visually describe business tasks and utilize them.

**[Description]**

- ✓ Understand familiar business tasks under the supervisor's guidance, and understand and utilize the typical visual representations, OR (Operations Research) and IE (Industrial Engineering) techniques, required for analysis.

**(1) Understanding business tasks**

Utilize visual representations such as a workflow diagram to understand details of business tasks.

**(2) Job analysis and operational planning**

Perform job analysis and operational planning using typical techniques, such as diagrams.

**Sample terms** Pareto chart, ABC analysis, PERT (arrow diagram), critical path method, scatter diagram, radar chart, control chart, histogram, regression analysis

**Sample usage** data analysis using tables or graphs, business improvement using a Pareto chart or using regression analysis

**(3) Decision making**

Make decisions to efficiently solve a problem.

**Sample terms** cause and effect diagram (fishbone diagram), simulation, inventory control, credit control, ordering method

**Sample usage** decision making under the provided conditions, understanding of business tasks dealing with inventory control

**(4) Problem-solving techniques**

Understand the concepts about the fundamental techniques for solving problems.

**Sample terms** brainstorming, decision tree, affinity diagram

**3. Accounting and financial affairs****[Goal]**

- Understand the fundamental concepts of accounting and financial affairs for corporate activities and business management.

**[Description]**

- ✓ For corporate activities or business management, understand the meanings and concepts of basic terms about accounting and financial affairs, such as a break-even point, and utilize them in familiar business tasks.

**(1) Accounting and financial affairs**

Understand the relationship between sales and profits.

**(a) Relationship between sales and profits**

Understand the terms and concepts

**Sample terms** profit, gross profit, operating profit, break-even point, cost, variable cost, fixed cost, volume of sales, variable expense ratio

**Sample usage** simple calculation of a break-even point and profit ratio

**(b) Types and roles of financial statements**

Understand the types and roles of financial statements in companies, such as an income statement, and account titles.

**Sample terms** balance sheet, cash flow statement, assets (net assets, current assets, fixed assets, deferred assets, tangible assets, intangible assets), liabilities (current liabilities, fixed liabilities), current ratio, profitability, return on investment

**Sample usage** reading of fundamental financial statements and analysis taking advantage of financial indexes (safety, profitability, etc.)

**Major category 1: Corporate and legal affairs**

**Middle category 2: Legal affairs**

#### **4. Intellectual property rights**

**[Goal]**

- Understand the types of intellectual property rights, the rights that should be protected by law, and the kinds of actions that are illegal.

**[Description]**

- ✓ Understand that the rights to intellectual creations, such as computer programs, music, and images, are protected by the related laws.

**(1) Copyright Act**

Understand that intellectual creations, such as music, movies, and computer programs, are covered by copyright and that copying without permission is illegal. In addition, understand that copyright is associated with the people who present the work, such as singers and broadcasting companies, and that presenting the work to the public without permission is illegal.

**(2) Laws on industrial property rights**

Understand that there are rights protected by registering an invention or a design, and understand that unapproved use is illegal.

**Sample terms** Patent Act, business model patent, Utility Model Act, Design Act, Trademark Act, trademark, service mark

**(3) Unfair Competition Prevention Act**

Understand that there is a law protecting trade secrets that are not protected by the Copyright Act and the laws on industrial property rights.

**(4) Software license**

Understand that a software license is a contract with the person or corporate body who owns the rights to grant permission to use the software.

**Sample terms** license agreement, open source software, free software, public domain software

**Sample usage** understanding terms and conditions of a license, and the contract suitable for the purpose

**(5) Other rights**

Understand that there are “rights of portrait” and “rights of publicity” under legal precedents, even if the clearly stated law is undefined.

#### **5. Laws on security**

**[Goal]**

- Understand the outline of typical laws on security.

**[Description]**

- ✓ Learn that there is a law defining the basics policies regarding the national cyber security (Basic Act on Cyber Security), and understand its outline.
- ✓ Understand that there is a law governing unauthorized access (Act on the Prohibition of Unauthorized Computer Access) that can punish even if there is no actual damage.

**(1) Basic Act on Cyber Security**

Understand the purpose and the fundamental concepts of "Basic Act on Cyber Security".

**(2) Act on the Prohibition of Unauthorized Computer Access**

Understand unauthorized access and how to prevent it. In addition, understand the fundamental concepts of the Act on the Prohibition of Unauthorized Computer Access.

**6. Laws on labor and transaction**

<b>[Goal]</b> <ul style="list-style-type: none"><li>➤ Understand the outline of familiar laws on labor.</li><li>➤ Understand the outline of familiar laws on transaction.</li></ul>
<b>[Description]</b> <ul style="list-style-type: none"><li>✓ Learn that there are laws on labor and transaction to improve various conditions associated with labor and transaction, and understand their outlines.</li></ul>

**(1) Laws on labor**

Understand the fundamental concepts of “Labor Contract Act”, “Labor Standards Act”, and “Act for Securing the Proper Operation of Worker Dispatching Undertakings and Improved Working Conditions for Dispatched Workers.”

**Sample terms** Flexitime, free time system

**(a) Labor Standards Act**

Understand that the law regulates what must be observed in a labor contract, such as minimum wages, overtime work wages, and working hours.

**(b) Act for Securing the Proper Operation of Worker Dispatching Undertakings and Improved Working Conditions for Dispatched Workers**

Understand that there are regulations that dispatching business operators must observe, such as a license required to dispatch workers.

**(c) Nondisclosure agreement**

Understand that there is a contract governing trade secrets that should be kept confidential.

**(d) Contract types**

Understand the fundamental characteristics of a service contract and a dispatch contract as contract types.

**Sample terms** (quasi-)mandate contract, employment contract

**(2) Laws on transaction**

Understand the fundamental concepts of “the Act against Delay in Payment of Subcontract Proceeds, Etc. to Subcontractors” and “the Product Liability Act”.

**(a) Act against Delay in Payment of Subcontract Proceeds, Etc. to Subcontractors**

Understand that this law protects the interests of the subcontractors by preventing a delay in payment of subcontract proceeds, etc.

**Sample terms** Act on Specified Commercial Transactions

**(b) Product Liability Act**

Understand that a manufacturer is liable for damages when the consumers suffer loss of or injury to life, body, and property because of a defective product.

## 7. Other laws, guidelines, and engineer ethics

### [Goal]

- Understand the concepts about the norms of companies or the like and control your actions rightly.
- Understand the fundamental concepts of information disclosure requests to governmental agencies.

### [Description]

- ✓ Understand the practical approaches to compliance and corporate governance to clarify the norms of companies or the like, and understand the concepts of related laws and guidelines. In addition, understand the information disclosure requests for documents created by governmental agencies.

#### (1) **Compliance**

In order to support improvements in compliance by companies or the like, understand and practice the codes of ethics that should be observed in addition to laws in performing business tasks.

##### (a) Act on the Protection of Personal Information

Understand the protection of personal information, the relevant employers, and the duty regulations.

##### (b) Various standards

Understand that the Standards of Measures against Computer Viruses, the Standards of Measures against Unauthorized Access to Computers, and the System Management Standards are used as norms for information systems.

**Sample terms** Information security countermeasure guidelines, Information Security Management Standards

##### (c) Information ethics

Understand and practice the legal imperatives and norms that you should comply with in an information society, such as protection of intellectual property, personal information, and privacy, as well as morals and netiquette.

**Sample terms** Act on the Limitation of Liability for Damages of Specified Telecommunications Service Providers

#### (2) **Corporate governance**

Understand the practical approaches to corporate governance to improve the health of management activities for winning the trust of customers and markets.

**Sample terms** Whistleblower Protection Act, internal control reporting system

#### (3) **Information disclosure requests to governmental agencies**

Understand that anyone can submit a request for disclosure of documents created by governmental agencies.

**Sample terms** Act on Access to Information Held by Administrative Organs

## 8. Standardization

### [Goal]

- Understand the significance of standardization.

### [Description]

- ✓ Understand that standardization organizations and industrial organizations, such as ISO and IEC, standardize for compatibility, and recognize the significance of the activity, along with familiar examples of standardization.

(1) **Standardization**

Understand the need and significance of standardization.

**Sample terms** De facto standard

(2) **Examples of the standardization in IT**

Understand the examples and the characteristics of familiar standardizations in IT.

**Sample terms** bar code, JAN (Japanese Article Number) code, QR Code

(3) **Standardization organizations and specifications**

Understand typical international standardization organizations, domestic standardization organizations, and the familiar examples of specifications.

**Sample terms** ISO (International Organization for Standardization),  
IEC (International Electrotechnical Commission),  
IEEE (Institute of Electrical and Electronics Engineers),  
W3C (World Wide Web Consortium),  
JIS (Japanese Industrial Standards),  
ISO9000 (quality management system),  
ISO14000 (environmental management system),  
ISO/IEC 27000 (information security management system)

## 9. Business strategy techniques

### [Goal]

- Understand the fundamental concepts about typical analysis methods of management information.
- Apply office tools (software packages) to familiar business tasks.

### [Description]

- ✓ Use the techniques of analyzing the information about corporate activities under the supervisor's guidance, and understand the fundamental concepts of analysis methods of management information for establishing business strategy.
- ✓ For solving problems and increasing efficiency for assigned business tasks, use office tools.

#### (1) **Analysis methods of management information**

Understand the typical techniques about utilizing information for business strategy, and use analysis results.

**Sample terms** SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis, PPM (Product Portfolio Management), external environment, internal environment, 3C analysis

**Sample usage** sales, market, and product analysis using analysis methods

#### (2) **Terms on business strategy**

Understand the typical terms on business strategy.

**Sample terms** competitive superiority, innovation, core competence, niche strategy, alliance, outsourcing, M&A (mergers and acquisitions), OEM (Original Equipment Manufacturer), fables, franchise chain, MBO (Management Buy-Out), TOB (Take-Over Bid), scale economy, experience curve, vertical integration, commoditization, benchmarking, logistics

#### (3) **Using office tools**

Utilize office tools (software packages), such as spreadsheet software, database software, and presentation software, for solving problems and increasing the efficiency of assigned business tasks.

**Sample usage** selecting tools according to usage; using tools for arrangement, search, analysis, processing, and representation of data

## 10. Marketing

### [Goal]

- Understand the fundamental concepts relevant to marketing.

### [Description]

- ✓ Learn the existence and purpose of marketing, and understand the concepts of using information in marketing by collection and analysis of related data.

#### (1) **Basics of marketing**

Understand the fundamental concepts and information utilization about marketing.

**Sample terms** marketing research, sales; product and purchase plan, sales promotion, customer satisfaction, UX (User Experience) 4P, 4C, RFM (Recency: last purchase day, Frequency: purchase frequency, Monetary: cumulative

purchase amount) analysis, Ansoff growth matrix, opinion leader, segment marketing, direct marketing, omnichannel, search advertising, push strategy, brand strategy, product life cycle, positioning  
**Sample usage** sales promotion dealing with customer analysis

## 11. Business strategy and goal/evaluation

<p><b>[Goal]</b></p> <ul style="list-style-type: none"> <li>➤ Understand the typical information analysis techniques for planning business strategies.</li> </ul>
<p><b>[Description]</b></p> <ul style="list-style-type: none"> <li>✓ Understand the techniques aiming at target setting and evaluation as the typical information analysis techniques for planning business strategies.</li> </ul>

### (1) **Information analysis techniques for business strategy planning and evaluation**

Understand the fundamental information analysis techniques and terms for target setting and evaluation about planning of business strategies. Learn the missions as the corporate philosophy and the visions as what the company wants to be.

**Sample terms** BSC (balanced score card), CSF (critical success factors), KGI (Key Goal Indicator), KPI (Key Performance Indicator), value engineering

**Sample usage** job analysis using the fundamental information analysis techniques

## 12. Business management system

<p><b>[Goal]</b></p> <ul style="list-style-type: none"> <li>➤ Understand the fundamental concepts of the business management system.</li> </ul>
<p><b>[Description]</b></p> <ul style="list-style-type: none"> <li>✓ Learn that there is a business management system to perform business management effectively and understand its fundamental concepts.</li> </ul>

### (1) **Business management system**

Understand the fundamental terms and concepts about business management system.

**Sample terms** CRM (customer relationship management), value chain management, SCM (supply chain management), TQC (Total Quality Control), TQM (Total Quality Management), ERP (Enterprise Resource Planning) package, six sigma, knowledge management, TOC (Theory Of Constraints)

**13. Planning of technology development strategy and technology development plan**

**[Goal]**

- Understand the significance and the purpose of technology development strategies.

**[Description]**

- ✓ Understand that technology development is promoted by the road map created based on the prediction of technology trends.

**(1) Technology development strategy and technology development plan**

Understand that the technology development strategies are created, which consider technical cooperation if needed, by surveying and analyzing technology trends and product trends, and evaluating technology owned by the company, for the purpose of obtaining competitive power in the future market. Understand that specific technology development will be advanced based on a road map after an approach to technology based on a technological strategy is planned.

**Sample terms** MOT (Management Of Technology), technology portfolio, patent strategy, technology estimate method, process innovation, product innovation

## 14. Business system

### [Goal]

- Understand the characteristics of typical systems in various business fields.

### [Description]

- ✓ In order to understand how the system is utilized in various business fields, understand the characteristics and concepts of the typical systems that are used in business fields, such as distribution and finance.

#### (1) **Systems in typical business fields**

Understand the characteristics of systems in typical business fields.

**Sample terms** distribution information system, financial information system, POS (point of sales) system, GPS (global positioning system) application system, GIS (Geographic Information System), ETC (electronic toll collection) system, IC card, RFID (IC tag), electronic money, SFA (Sales Force Automation), traceability, smart grid, CDN (Content Delivery Network), AI (Artificial Intelligence), Crowdfunding

**Sample usage** business improvement using IC cards or RFID

#### (2) **Software packages in typical business systems**

Understand the characteristics of the software packages in typical business systems.

**Sample terms** software package for each job role (accounting, marketing support, sales management software), software package for each industry (software packages for finance, medical services, production, transportation), DTP (DeskTop Publishing)

#### (3) **Systems in other fields**

Understand that there are typical administrative systems such as the Basic Resident Register Network System, and an electronic application and notification system.

**Sample terms** CTI (Computer Telephony Integration), electronic bidding, Social Security and Tax Number

## 15. Engineering system

### [Goal]

- Understand the characteristics of typical systems in the engineering field.

### [Description]

- ✓ Learn the characteristics and concepts of typical engineering systems to understand the system usage situation in the engineering field.

#### (1) **IT utilization in the engineering field**

Understand the significance of IT utilization in the engineering field, such as “the support of design and production by automation” and “the promotion of efficiency in production management and inventory control.”

#### (2) **Typical engineering systems**

Understand the characteristics of typical engineering systems, such as CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing).

**Sample terms** CIM (Computer-Integrated Manufacturing), concurrent engineering, simulation, sensing technology, production method, JIT (Just In Time), FMS (Flexible Manufacturing System), MRP (Material Requirements Planning)

## 16. e-business

### [Goal]

- Understand electronic commerce and the characteristics of typical systems.

### [Description]

- ✓ Learn the characteristics, including risks, to understand familiar electronic commerce using a network.

#### (1) **Electronic commerce**

Understand the fundamental concepts of electronic commerce.

##### (a) The characteristics of electronic commerce

Understand the fundamental characteristics, including that, in product sales by electronic commerce, the cost for stores or salesclerks can be reduced and a business can be started with little investment.

**Sample terms** Long tail, catalog sales

##### (b) The classifications of electronic commerce

Understand the types of electronic commerce.

**Sample terms** EC (electronic commerce or e-commerce), B2B (business to business), B2C (business to consumer), C2C (consumer to consumer), O2O (Online to Offline), EDI (Electronic Data Interchange)

##### (c) Using electronic commerce

Understand the specific examples of usage and method of electronic commerce.

**Sample terms** electronic marketplace, online mall, electronic auction, Internet advertising, Internet banking, Internet trading, SEO (Search Engine Optimization), affiliate, escrow service, opt-in mail advertisement, banner advertisement, recommendation, digital signage

#### (2) **Points to note in electronic commerce**

Recognize risks in electric commerce and the need of security measures, and understand the fundamental points to note.

## 17. Consumer appliances and industrial devices

### [Goal]

- Understand the concepts of embedded systems and typical examples.

### [Description]

- ✓ In order to understand the embedded systems utilized in familiar appliances and devices, grasp its fundamental characteristics and examples.

#### (1) **Embedded systems**

Understand the fundamental concepts of what an embedded system is.

#### (2) **Consumer appliances and industrial devices**

Understand the fundamental concepts of what a consumer appliance is and what an industrial

device is.

**Sample terms** robotics, firmware

**(3) Examples of embedded systems**

Understand the examples of familiar embedded systems.

(a) Consumer appliances

Understand the examples of typical consumer appliances, such as rice cookers, washing machines, air-conditioners, cell phones, and personal digital assistant.

(b) Industrial devices

Understand the examples of typical industrial devices, such as industrial robots, automatic warehouse systems, and vending machines.

**Sample terms** ATM (Automatic Teller Machine)

## 18. Information systems strategy

### [Goal]

- Understand the significance and purpose of information system strategies and the concepts of strategic goals.

### [Description]

- ✓ Understand the significance and purpose of information system strategies planned to realize business strategies and the concepts of strategic goals.

#### (1) **Information systems strategy**

Understand that an information system is developed to achieve the business strategy and enterprise strategy of a company.

#### (2) **Strategic goals**

Understand that business strategy and enterprise strategy are established as a specific goal through business environment analysis and a SWOT analysis.

**Sample terms** EA (Enterprise Architecture)

## 19. Business process

### [Goal]

- Understand the concepts of business improvement and problem solving.
- Understand the concepts of typical modeling in business models.
- Utilize groupware and office tools effectively.
- Understand the purpose and concepts of increasing operational efficiency by using computers and networks.

### [Description]

- ✓ Understand the concepts of modeling the business process and considering its improvement plan so that you can participate in a study of computerization of your assigned business tasks under the supervisor's guidance.
- ✓ Utilize computers and networks effectively to improve business and facilitate communication.

#### (1) **Business process**

For business improvement and problem solving, it is necessary to analyze and understand the present business process. Understand the concepts of the typical modeling used in that case

##### (a) Modeling

Understand the concepts of modeling, which indicate the business scheme and business process visually.

##### (b) Typical modeling techniques

Understand the concepts of the typical modeling methods.

**Sample terms** E-R diagram (Entity Relationship Diagram), DFD (Data Flow Diagram)

##### (c) Analysis of business processes

Understand typical techniques and systems about modeling of business processes.

**Sample terms** BPR (Business Process Reengineering), BPM (Business Process Management), workflow

(2) **Business improvement and problem solving**

Understand that the efficiency of business tasks can be increased by utilizing computers and networks efficiently for familiar business tasks. In addition, acquire the ability to analyze business processes, make business improvement, and solve problems. Understand the details of business processes from workflows and E-R diagrams to interpret business data represented in tables and graphs, find problems, and improve them.

(3) **Effective use of IT**

Understand various methods for business improvement and operational efficiency by utilizing IT.

(a) Operational efficiency by computerization

Computerization includes various methods such as the installation of commercial software packages, installation of groupware and office tools, development and installation of individual information systems, and network construction. Understand the characteristics and advantages of each method.

**Sample terms** BYOD (Bring Your Own Device), IoT (Internet of Things), M2M (Machine to Machine)

(b) System utilization for communication

Understand how to use specific tools for smooth communication required for business improvement or effective business and use them for business operations.

**Sample terms** video conference, e-mail, electronic bulletin board, blog, chat, SNS (Social Networking Service)

**Sample usage** utilization of e-mail for business tasks, upload of shared files

## 20. Solution business

**[Goal]**

- Understand the concepts of solutions through typical services.

**[Description]**

- ✓ In order to understand the concepts of solutions, learn the offering methods and sample usage of typical solutions.

(1) **Solutions**

Understand that, in the solution business, it is necessary to build a trusting relationship with customers, learn about customer problems, propose problem solutions, and support the problem solving. In addition, understand the process of solution offering in computerization.

(2) **The forms of solutions**

Understand that the solutions for computerization include various approaches such as in-house development, introduction of software packages, and utilization of services provided by other companies.

**Sample terms** SI (System Integration), cloud computing, SaaS (software as a service), PaaS (Platform as a Service), IaaS (Infrastructure as a Service), DaaS (Desktop as a Service), ASP (application service provider), outsourcing, hosting service, housing service, on-premises

## 21. System utilization promotion and evaluation

### [Goal]

- Understand the significance and purpose of promotion activities of system utilization.

### [Description]

- ✓ In order to take advantage of information systems in business management, understand that the dissemination and enlightenment of information technology, learn information literacy skills, and make the most use of data in assigned business tasks.

#### (1) **Information literacy**

In order to perform business tasks, search, organize, analyze, and transmit information by taking advantage of information technology such as computers and application software.

#### (2) **Utilization of Data**

Analyze data accumulated through information systems to improve business and solve problems in assigned business tasks.

**Sample terms** BI (Business Intelligence) tool, data warehouse, data mining, big data

#### (3) **Dissemination and education**

Understand the significance of education and the dissemination of information technology through educational activities and programs to make use of information systems.

**Sample terms** e-learning, gamification, digital divide

**Major category 3: System strategy**  
**Middle category 7: System planning**

**22. Computerization planning**

**[Goal]**

- Understand the purpose of computerization planning.

**[Description]**

- ✓ Understand the purpose and process of computerization planning so that you can participate in a study of computerization of your assigned business tasks under the supervisor's guidance.

**(1) Computerization planning**

Understand how to make computerization initiatives and basic computerization policies based on an information systems strategy through target business task analysis with respect to computerization planning, and clarify the whole image of computerization, such as the order of each system development, approximate cost, and effect.

**Sample terms** schedule, organization, risk analysis, cost effectiveness, scope, planning process

**23. Requirements definition**

**[Goal]**

- Understand the purpose of the operational requirements definition based on the analysis of current state.

**[Description]**

- ✓ Understand the purpose of operational requirements definition, analyze assigned business tasks, and check and organize data, so that you can participate in a study of computerization of your assigned business tasks under the supervisor's guidance.

**(1) Operational requirements definition**

Understand that operational requirements definition defines the functions and requirements that the system must provide in consideration of the business strategy, system strategy, and needs of users.

**Sample usage** surveys of user requirements, analysis of surveys, analysis of the current business tasks, definition of operational requirements, definition of functional and non-functional requirements, agreement of requirements

**24. Procurement planning and implementation**

**[Goal]**

- Understand the fundamental flow of procurement.

**[Description]**

- ✓ Understand the fundamental flow of procurement so that you can participate in a study of computerization of your assigned business tasks under the supervisor's guidance.

**(1) Procurement flow**

Understand that the fundamental flow of procurement contains creation and distribution of a request for information (RFI) and a request for proposal (RFP), creation of selection criteria,

acquisition of proposals and estimates from the vendors, comparative evaluation of the proposals, selection of suppliers, conclusion of contracts, and acceptance and inspection.

**(2) Request for information**

Understand that, in order to collect the information about the means that can be considered and technology trends before creating the request for proposal, the request for information expressly describes the purpose of computerization and the outline of the business operations for vendors, and requests them to supply information.

**(3) Request for proposal**

Understand that a request for proposal is a document for specifying the outline of the system to introduce, items requested for the proposal, procurement conditions, and requesting the submission of proposals from vendors.

**(4) Proposal**

Understand that vendors study system configuration, the development methods based on the RFP, create proposals, and propose to requestors.

**(5) Estimate**

Understand that an estimate is a document that shows the cost concerning development, operation, and maintenance of the system and it is important to select suppliers and check the details of the order.

# Management

**Major category 4: Development technology**  
**Middle category 8: System development technology**

## 25. System development technology

### [Goal]

- Understand the fundamental flow of the process of system development.
- Understand the concepts of the estimate in system development.

### [Description]

- ✓ In order to understand processes through which systems are developed, learn the flow of processes, such as requirements definition, system design, programming, and testing, and learn the concepts of an estimate and review.

### (1) **System development process**

Understand what kinds of processes there are in system development.

#### (a) System requirements definition and software requirements definition

Understand that the system requirements definition and the software requirements definition, which clarify the functions, performance, and details required for the system and software, are performed.

**Sample terms** functional requirement, non-functional requirement, joint review, quality characteristics (functionality, efficiency, usability, reliability, etc.)

#### (b) System design and software design

Learn about systems architecture design, software architecture design, and software detailed design, and understand the fundamental role of each of them.

**Sample terms** external design, internal design

#### (c) Programming

A program is created according to the system design. Understand that a unit test is performed to verify whether there are any errors (bugs) in each program created.

**Sample terms** coding, compiler, white box test, debug, code review

**Sample usage** creation and analysis of test data

#### (d) Testing

Programs are consolidated after the unit tests are completed and verified whether the software or system works as specified. Learn that there is a cycle of planning, implementation, and evaluation in a test, and understand that it is necessary to evaluate the gap between target and achievement in testing.

**Sample terms** integration test, system test, operational test, black box test, regression test

#### (e) Software acceptance

Understand that software is delivered after the ordering company checks whether the software works normally by using it under the same conditions as actual operation and finds it satisfactory. In addition, understand that training of system users is provided.

**Sample terms** user manual, acceptance test, migration

#### (f) Software maintenance

Understand that, in software maintenance, in order to support the stable operation of the

system, progress of information technology, and change of business strategy, the program is corrected and modified.

**(2) Estimate of software**

Understand the fundamental concepts in estimating the person hours required for development and development period based on the software development scale and development environment.

**Sample terms** FP (Function Point) method, analogous estimating method

## 26. Development process and methods

### [Goal]

- Understand the outline, significance, and purpose of the typical development methods.

### [Description]

- ✓ In order to perform software development efficiently, understand the methods and concepts about software development.

#### (1) **Major software development methods**

Understand the characteristics of the typical software development methods.

**Sample terms** structured method, object orientation, data oriented approach, process oriented approach, use case, UML

#### (2) **Major software development models**

Understand the characteristics of the typical software development models.

**Sample terms** waterfall model, spiral model, prototyping model, RAD (Rapid Application Development), agile, reverse engineering

#### (3) **Framework for development process**

Understand the characteristics of a typical framework for development process.

##### (a) Common frame

Understand the basic concept of SLCP (Software Life Cycle Process) as a common frame where each working item has been defined and standardized for software development and proper transaction.

##### (b) Capability maturity model

For evaluation and improvement of the development and maintenance processes, understand the basic concept of CMMI (Capability Maturity Model Integration) where a process maturity of a system development organization has been modeled and the maturity has been defined in five levels.

## 27. Project management

### [Goal]

- Understand the significance, purpose, and concepts of project management.
- Understand the fundamental flow of the process in project management.

### [Description]

- ✓ In order to promote a system development project smoothly, understand the overall fundamental knowledge of project management.

#### (1) **Project management**

Understand what project management is and what processes are included.

##### (a) What is a project?

Understand the significance and characteristics of a project.

##### (b) Process in project management

Understand that it is a flow that starts up a project, promotes it based on the plan, controls progress, cost, quality, and human resources through various reviews and achieves the goal.

**Sample terms** project charter, project manager, project member, stakeholder, project scope management, project communication management, project risk management, WBS (Work Breakdown Structure), arrow diagram, Gantt chart, countermeasures against risks (avoid, mitigate, accept, transfer)

**Sample usage** optimum allocation of human resources in business tasks, schedule management of a project, how to report the progress of business tasks

**Major category 6: Service management**  
**Middle category 11: Service management**

**28. Service management**

**[Goal]**

- Understand the significance, purpose, and concepts of IT service management.

**[Description]**

- ✓ Understand that the activities for operating an information system stably and efficiently and maintaining or improving the quality of service to users are required. Learn that IT service management exists as the method of operations management for that purpose, and understand its significance, purpose, and concepts.

**(1) IT service management**

Understand that IT service management is the method of the operations management to increase efficiency of IT operation and enhance the quality of services including availability by regarding the business tasks of IT department as IT service and organizing them.

**(2) ITIL**

Understand that there is a concept of ITIL (Information Technology Infrastructure Library) as a framework of IT service management.

**(3) Service level agreement**

Understand that, in order to stipulate the quality and scope of service to offer and to perform operations management based on the agreement with the service receiver, an SLA (Service Level Agreement) is concluded for the IT service management.

**(4) Service level management**

In order to achieve the service level that is agreed between the service receiver and provider, understand that there is SLM (Service Level Management) that aims at maintaining and improving service level through the PDCA cycle.

**Sample terms** availability management (management of service availability, etc.)

**29. Service support**

**[Goal]**

- Understand related items, such as service desk, in service support.

**[Description]**

- ✓ In order to understand IT service operation, learn the fundamental role of the service desk (help desk) in the core of service support, and the fundamental configuration of the management functions (roles) included in service support.

**(1) Service support**

Understand what kinds of roles and functions service support consists of as a series of activities about daily operations.

**Sample terms** incident management (fault management), problem management, configuration management, change management, release management, version control

(2) **Service desk (help desk)**

Understand that a service desk offers a single window to the inquiries from the users of the system, records and manages the inquiries, hands over the inquiries to appropriate departments, and records call-handling results.

**Sample terms** escalation, FAQ

**30. Facility management**

**[Goal]**

➤ Understand the concepts about system environment maintenance.

**[Description]**

✓ Understand that there is facility management as a concept for a company or the like to maintain system environment at the best state.

(1) **System environment maintenance**

Understand the need for the system environment maintenance that maintains the system environment of computers, networks, facilities, and equipment.

**Sample terms** green IT (green of IT), UPS (Uninterruptible power supply), private electric generator, security wire, surge protection

(2) **Facility management**

Understand that, in order to improve resources, such as a building and equipment at their optimum state, there is a concept of facility management.

**Major category 6: Service management**  
**Middle category 12: System audit**

**31. System audit**

**[Goal]**

- Understand the significance, purpose, concepts, and target of system audit.
- Understand the fundamental flow of the process in system audit.

**[Description]**

- ✓ Understand the purpose and main types of audits in a company or the like. In addition, understand the significance, purpose, and fundamental flow about the system audit performed for an information system.

**(1) Audit**

Understand the purpose and types of audits.

**Sample terms** accounting audit, operations audit, information security audit, system audit

**(2) System audit**

Understand the purpose of system audit, and the fundamental flow of the process in system audit.

**(a) Purpose of system audit**

Understand that the purpose of system audit is to investigate the information system from a broad viewpoint and to judge whether the system contributes to management, independently of audited departments.

**(b) Process flow in system audit**

Understand that the process of system audit includes various activities such as overall check of an information system, evaluation, explanation of the result to the management, advice and check for improvement, and follow-up.

**Sample terms** system auditor, system audit standards, system audit planning, preliminary audit, main audit, audit evidence, system audit report

**32. Internal control**

**[Goal]**

- Understand the purpose and concepts of internal control and IT governance in a company or the like.

**[Description]**

- ✓ Learn that internal control and IT governance are provided to realize sound management of a company or the like, and understand the purpose and concepts.

**(1) Internal control**

Understand that internal control is the mechanism of building and running the organization so that the company itself or the like can perform its business in a right and proper way. Understand that clarification of business processes, division of job responsibilities, creation of enforcement rules, and establishment of a check system are necessary for its realization.

**Sample terms** Monitoring, RCM (Risk Control Matrix)

**(2) IT governance**

Understand that IT governance establishes an information systems strategy and controls its

implementation, and that it is required for a company or the like to enhance its competitive power.

# Technology

**Major category 7: Basic theory**  
**Middle category 13: Basic theory**

## 33. Discrete mathematics

### [Goal]

- Understand the fundamental concepts of radixes.
- Understands the fundamental concepts of sets.

### [Description]

- ✓ In order to know fundamental theories about numeric values and data handled by computers, understand the fundamental concepts of the representation and operation of binary numbers, sets, and logical operations.

### (1) **Numbers and representation**

Understand the concepts of the representation of binary numbers, method of radix conversion, representation of negative numbers, and addition and subtraction of binary numbers, as well as the range of numbers that can be represented.

### (2) **Sets**

Understand the fundamental concepts and usage of sets, propositions, Venn diagrams, and truth tables.

### (3) **Logical operations**

Understand the concepts of logical operations, fundamental operations, and the usage of truth tables.

**Sample usage** conditional search using AND, OR, NOT, and XOR (exclusive OR)

## 34. Applied mathematics

### [Goal]

- Understand the fundamental concepts of probability and statistics.

### [Description]

- ✓ Understand the fundamental concepts of probability, statistics, and queueing theory required for collection, analysis, and processing of data.

### (1) **Probability and statistics**

Understand the fundamental concepts of probability and statistics.

#### (a) The outline of probability

Understand the concepts of permutation, combination, and probability.

#### (b) The outline of statistics

Understand the concepts of fundamental statistics, such as frequency table, histogram, and average.

### (2) **Queueing theory**

Understand the basic concept of a queue. In this case, no question is given with respect to the theoretical contents of the M/M/1 model or the like.

### 35. Theory of information

#### [Goal]

- Understand the unit of information content.
- Understand the fundamental concepts of digitization of information.

#### [Description]

- ✓ In order to know fundamental theories about numeric values and data handled by computers, understand how to express information content, the concept of digitization, and representation of characters.

(1) **The unit of information content**

Understand the information content such as a bit and a byte and the method of expressing prefixes (K, M, G, T, m,  $\mu$ , n, p, etc.).

(2) **Digitization**

Understand the fundamental concepts of digitization (A/D conversion), such as quantization, sampling, and encoding, as well as the characteristics of analog and digital.

(3) **Representation of characters**

Understand that characters are represented numerically inside a computer.

**Sample terms** ASCII code, EUC (Extended Unix Code), JIS code, Unicode

**Major category 7: Basic theory**  
**Middle category 14: Algorithm and programming**

**36. Data structure**

**[Goal]**

- Understand the fundamental concepts of data structures.

**[Description]**

- ✓ Understand the fundamental concepts of data and data structures so that you can perform analysis and arrangement of business data under the supervisor's guidance.

**(1) Data and data structures**

Understand the fundamental concepts of data structures, such as the types of variables and fields, arrays, records, and files.

**Sample terms** List, queue, stack, tree structure, binary tree

**37. Algorithm**

**[Goal]**

- Understand the fundamental concepts and expressions of algorithms and flowcharts.

**[Description]**

- ✓ Understand the fundamental concepts and expressions of algorithms and flowcharts so that you can analyze operations and perform computerization under the supervisor's guidance.

**(1) Flowchart**

Understand the symbols in flowcharts, and the expressions of procedures.

**(2) The basic structure of an algorithm**

Understand control structures such as sequence, selection, and iteration (or repetition).

**(3) Fundamental algorithms**

Understand the total, search, merge, and sort.

**38. Programming and programming languages**

**[Goal]**

- Understand the role of programming languages and programming.

**[Description]**

- ✓ Understand that programming is performed using programming languages in the system development.

**(1) Programming and programming languages**

Understand that programming is to describe an algorithm using a programming language, and that an algorithm can be executed in computers by programming.

**Sample terms** C, Java, COBOL, script language, SQL

### 39. Other languages

#### [Goal]

- Understand the types and fundamental usage of typical markup languages.

#### [Description]

- ✓ Understand the types and characteristics of the typical markup languages widely used as means of expression in computers. In addition, understand the simple usage (including writing) in using markup languages.

#### (1) **Markup languages**

Understand the characteristics and the fundamental rules in describing typical markup languages.

**Sample terms** HTML (HyperText Markup Language), XML (Extensible Markup Language), tags, SGML

**Sample usage** representation in HTML

#### 40. Processor

**[Goal]**

- Understand the fundamental configuration and roles of computers.

**[Description]**

- ✓ Understand the fundamental components composing computers, and the concepts of the mechanism, functions, and performance of the processor, which is the core of the computer system.

(1) **The configuration of a computer**

Understand that a computer consists of five fundamental functions and how they are integrated.

**Sample terms** operation, control, storage, input, output

(2) **The fundamental mechanism of a processor**

Understand the concepts of the fundamental mechanism, functions, and performance of a processor.

**Sample terms** operation, control, CPU, multi-core processor, GPU, clock frequency

#### 41. Memory

**[Goal]**

- Understand the types and characteristics of memory.
- Understand the types and characteristics of storage media.

**[Description]**

- ✓ Learn that there are various types of computer memory, which have various roles, and understand the types and characteristics of storage media and the concepts of storage hierarchy.

(1) **Memory**

Understand the characteristics, such as differences of memory capacity and access speed by types of memory.

**Sample terms** RAM, ROM, flash memory, volatility

(2) **Storage media**

Understand the characteristics that vary with the types of storage media, such as storage capacity, portability, usage, and purpose.

**Sample terms** HDD, SSD, CD (CD-ROM, CD-R), DVD (DVD-ROM, DVD-RAM, DVD-R), Blu-ray disc, USB memory, SD card

(3) **Storage hierarchy**

Understand the concepts of storage hierarchy.

**Sample terms** cache memory, main memory, auxiliary memory

## 42. Input/output devices

### [Goal]

- Understand the types and characteristics of input/output interfaces.

### [Description]

- ✓ In order to utilize familiar information devices, understand the types and characteristics of input/output interfaces. In addition, understand that device drivers are required to utilize them.

#### (1) **Input/output interfaces**

Understand the types of input/output interfaces (wired interface and wireless interface) as well as the characteristics of data transfer methods (serial and parallel).

**Sample terms** analog, digital, USB, IEEE 1394, PCMCIA, HDMI, analog RGB, DVI, Bluetooth, IrDA, RFID, NFC (Near Field Communication)

#### (2) **Device drivers**

Understand the functions of device drivers and PnP (Plug and Play).

**Major category 8: Computer system**  
**Middle category 16: System component**

**43. System configuration**

**[Goal]**

- Understand the fundamental characteristics of system configurations.

**[Description]**

- ✓ Learn that there are various configuration methods in terms of the processing modes and the utilization in system configurations. Understand the examples of typical systems and the fundamental characteristics of the client/server system, one of the distributed processing systems.

**(1) Processing modes**

Understand the characteristics of typical processing modes.

**Sample terms** centralized processing, distributed processing, parallel processing, replication

**(2) System configurations**

Understand the characteristics of typical system configurations.

**Sample terms** dual system, duplex system, client/server system, Web system, peer-to-peer, cluster, thin client, NAS, RAID

**(3) Utilization**

Understand the characteristics of typical utilization.

**Sample terms** interactive processing, real-time processing, batch processing, virtualization

**44. System evaluation indexes**

**[Goal]**

- Understand the concepts of the performance, reliability, and economical efficiency of a system.

**[Description]**

- ✓ Understand the evaluation indexes for measuring the performance, reliability, and economical efficiency of a system.

**(1) System performance**

Understand the concepts about the evaluation of system performance.

**Sample terms** response time, benchmark

**(2) System reliability**

Understand the concepts about the evaluation of system reliability.

**(a) The indexes showing system reliability**

Understand the concepts of typical indexes for indicating reliability.

**Sample terms** availability, failure rate, MTBF (Mean Time Between Failure), MTTR (Mean Time To Repair)

**Sample usage** study of the availability improvement plan

**(b) The design of reliability**

Understand the concepts of the typical system configurations and reliable design for improvement in reliability.

**Sample terms** dual system, duplex system, fail safe, fault tolerant, foolproof

(3) **Economical efficiency of a system**

Understand the concepts about evaluation of economical efficiency of a system.

**Sample terms** initial cost, operational cost, TCO (Total Cost of Ownership)

**Major category 8: Computer system**  
**Middle category 17: Software**

**45. Operating system**

**[Goal]**

- Understand the necessity, functions, and types of OSs (Operating Systems).

**[Description]**

- ✓ Understands OSs in terms of management and utilization of computer systems, and understand the characteristics of each of the typical types.

**(1) The necessity for OS**

Understands that an OS has control and management functions so that it can provide hardware and software resources in a computer for users or application software efficiently.

**(2) The functions of OS**

Understand the functions, such as user management (profiles and accounts), file management, input/output management, and resource management.

**Sample usage** management of registration and deletion of user IDs, management of the access privilege of each user, virtual storage

**(3) The types of OSs**

Understand that there are various types of operating systems, such as Windows, Mac OS, UNIX, and Linux. In addition, understand the problems in exchange of data between different types of operating systems.

**46. File system**

**[Goal]**

- Understand the concepts of file management and use fundamental functions.
- Understand the fundamental concepts of backup.

**[Description]**

- ✓ From a viewpoint of utilizing a system in an office, understand the concepts of file management and how to use fundamental functions. In addition, understand the concepts, such as the necessity for backup and generation management, in preparation for damage of the files by operational errors and system failures.

**(1) File management**

Understand the fundamental mechanism of file management and the access method to files, and perform fundamental handling, such as file sharing and configuring access privileges, in familiar business tasks.

**Sample terms** root directory, current directory, file extension, fragmentation

**Sample usage** directory management, file sharing, setup of access privileges, specification of an absolute path and a relative path

(2) **Backup**

Understand fundamental concepts, such as the necessity, acquisition method, acquisition procedure, and generation management for backups.

**Sample terms** archive

**47. Development tools**

**[Goal]**

➤ Understand the characteristics and basic operations of software packages, such as office tools.

**[Description]**

✓ Understand the characteristics of software packages, such as word processing software and spreadsheet software, and understand the fundamental operations for utilizing them in business tasks.

(1) **Software packages**

Understand the characteristics of software packages, such as word processing software and spreadsheet software. In addition, understand the need for installing software packages.

(2) **Word processing software**

Understand the method of creating documents using the basic functions in word processing software and its characteristics.

**Sample usage** creation of documents and tables, embedding of charts and graphs, effective use of clipboard

(3) **Spreadsheet software**

Understand the method of processing data using the basic functions in spreadsheet software and its characteristics.

**Sample usage** cell reference, substitution in cells; specification methods of the four arithmetic operations; utilization of typical functions; selection, addition, deletion, insertion, sorting of data; search, creation of graphs

(4) **Presentation software**

Understand the method of utilize presentation software and its characteristics.

**Sample usage** creation of slides, selection of fonts, creation of figures, embedding of images

(5) **WWW browser (Web browser)**

Understand the method of searching for and acquiring necessary information from Web pages using a Web browser and its characteristics.

**Sample usage** utilization of search sites, information retrieval with conditions (AND, OR, NOT)

**48. Open source software**

**[Goal]**

➤ Understand the characteristics of OSS (Open Source Software).

**[Description]**

✓ Understand the characteristics, utilization purpose, and considerations in usage of OSS.

(1) **Open source software**

Understand the outline of open source software.

- (a) The characteristics of OSS  
Understand that there are the characteristics in OSS, such as disclosure of source codes, prohibition of limit of redistribution, and the principle of no warranty.
- (b) The types of OSS  
Understand that OSS includes various software such as operating systems, communication software, office software, database management systems, and application software.

**49. Hardware (computer and I/O device)**

**[Goal]**

- Understand the types and characteristics of computers.
- Understand the types and characteristics of I/O devices.

**[Description]**

- ✓ Understand the types and characteristics about typical hardware, such as computers including PCs and I/O devices including a keyboard, a mouse, a display, and a printer, which make up an information system.

**(1) Computer**

Understand the types and characteristics of typical computers.

**Sample terms** PC, server, general purpose computer, personal digital assistant, tablet terminal, wearable device

**(2) I/O device**

Understand the types and characteristics of typical I/O devices.

**Sample terms** keyboard, mouse, tablet, image scanner, touch panel, bar code reader, display, printer, projector, Web camera, 3D printer

## 50. Human interface technology

**[Goal]**

- Understand the characteristics of human interfaces.

**[Description]**

- ✓ Understand the characteristics of human interfaces and the characteristics of each component of GUI, which is the typical human interface.

(1) **Human interface**

Understand that a human interface is an interface between users and systems used in various situations.

(2) **GUI**

Understand the characteristics of GUI (Graphical User Interface), such as the visual display using various graphics and the intuitive operations by a pointing device and other devices.

**Sample terms** window, icon, radio button, check box, list box, help function, menu bar, pull-down menu, pop-up menu, thumbnail

## 51. Interface design

**[Goal]**

- Understand the concepts of interface design.

**[Description]**

- ✓ Understand that the interface used as the contact point between users and systems has a great effect on ease of use and understanding a lot, and understand the concepts of desirable interfaces.

(1) **Screen and form design**

Understand the concepts of designing the screens and forms in software.

(a) **Screen design**

Understand the concepts of design of screens with good operability, such as smooth input flow, establishing the rules in using colors, and displaying the operation guide.

(b) **Form design**

Understand the concepts of an appropriate form design, such as placing relevant items nearby, including only minimum necessary information, and deciding the rules to unify forms.

(2) **Web design**

Understand that the viewpoint of usability (ease of use) is required in Web design, such as giving uniformity to the color tone and design in the whole site by using style sheets, and supporting a variety of WWW browsers.

**Sample terms** CSS (Cascading Style Sheets)

(3) **Universal design**

Understand the concepts of universal design, which enables as many people as possible to use comfortably irrespective of age, culture, and handicaps or ability differences.

**Sample terms** Web accessibility

**Major category 9: Technology element**  
**Middle category 20: Multimedia**

**52. Multimedia technology**

**[Goal]**

- Understand the types and characteristics of encodings of sounds and images.
- Understand the characteristics of compression and decompression of information.

**[Description]**

- ✓ Understand that information, including characters, sounds, and images, can be handled in computers in an integrated manner by means of multimedia technology. In addition, understand the characteristics of typical file formats for multimedia, and information compression and decompression.

**(1) Multimedia**

Understand that multimedia digitizes (encodes) the various forms of analog information, such as sound and image (static image and video), as well as text, and handles them in an integrated manner on computers.

**Sample terms** Web contents, hypermedia, streaming, DRM (Digital Rights Management), CPRM (Content Protection for Recordable Media), HTML5

**(2) File formats for multimedia**

Understand the characteristics of the main file formats used in sound processing, static image processing, and video processing.

**Sample terms** MP3 (MPEG Audio Layer-3), MIDI (Musical Instrument Digital Interface), JPEG (Joint Photographic Experts Group), GIF (Graphics Interchange Format), PNG (Portable Network Graphics), MPEG (Moving Picture Experts Group), PDF (Portable Document Format)

**(3) Compression and decompression of information**

Understand that the compression/decompression methods are used for large sound, image, and video data according to the types of media. In addition, understand that the purpose of compression includes the reduction of data storage and network load.

**Sample terms** ZIP, LZH, compression ratio, lossless compression, lossy compression

**53. Multimedia application**

**[Goal]**

- Understand the purpose and characteristics of multimedia application.

**[Description]**

- ✓ Understand the characteristics of graphics processing as a technique for representation and learn that there are various application areas of multimedia technology.

**(1) Graphics processing**

Understand the characteristics of colors, image quality, and drawing tools in graphics processing.

**(a) Representation of colors**

Understand that colors are represented by the additive primaries (RGB) and the subtractive primaries (CMY) in computers. In addition, learn that colors are represented with hue,

lightness, and saturation.

(b) Image quality

Understand pixels, resolution, and gray scale.

(c) Graphics software

Understand the characteristics of painting software and drawing software.

(2) **Multimedia application**

Understand the examples of typical application areas of multimedia technology.

**Sample terms**

CG (Computer Graphics), VR (Virtual Reality), AR (Augmented Reality), 3D, CAD, simulator, game

#### 54. Database architecture

**[Goal]**

- Understand the significance, purpose, and concepts of database and DBMS (Database Management System).

**[Description]**

- ✓ Note that a database is an important means for representing business tasks in terms of information (data), and that a database management system stores data structurally, maintains consistency, and is equipped with the functions for extracting it efficiently. In addition, understand the significance, purpose, and concepts of database.

(1) **Database**

Understand the purpose and characteristics of database and the concepts of the database model.

(2) **Database management system**

Understand the significance, purpose, and concepts of a DBMS (Database Management System) from a viewpoint of usage in familiar business tasks.

#### 55. Database design

**[Goal]**

- Understand the concepts of analysis and design for data.

**[Description]**

- ✓ Understand the necessity of analysis and design for data and its fundamental process.

(1) **Data analysis**

Understand the necessity of checking up and organizing the data used in business tasks.

(2) **Data design**

Organize and represent the data and the relations of data.

**Sample terms** E-R diagram, code design, field (item), record, file, table, primary key, external key, index

**Sample usage** arrangement and optimization of business data

(3) **Data normalization**

Understand the necessity of data normalization. However, the details of normalization are not on the test.

## 56. Data manipulation

### [Goal]

- Understand the operations such as data extraction.

### [Description]

- ✓ Understand data manipulation required to utilize relational databases.

#### (1) **Data manipulation**

Understand the typical data manipulation methods about a table. However, the syntax of SQL is not on the test.

**Sample usage** selection, insertion, update, projection, and joint operations using business data

## 57. Transaction processing

### [Goal]

- Understand the processing methods of database.

### [Description]

- ✓ Understand that it is necessary to maintain the consistency of a database under the exclusive control and recovery functions, in preparation of inquiring and updating data by multiple users.

#### (1) **The functions of a database management system**

About the exclusive control and the recovery functions required to achieve information sharing and data integrity, understand the necessity and outline of the functions.

**Major category 9: Technology element**  
**Middle category 22: Network**

**58. Network architecture**

**[Goal]**

- Understand the classification of LAN and WAN regarding networks.
- Understand the roles of the connecting devices for building a network.

**[Description]**

- ✓ Recognize that a network is an indispensable infrastructure for activities in a corporate or the like, and understand the outline of the roles of LAN, WAN, and typical network components. Configure familiar in-company LAN under the supervisor's guidance.

**(1) Network configuration**

Learn that the network in a familiar workplace consists of LAN and WAN, and understand the meaning of each.

**(2) Network component**

Understand the architecture of typical networks, such as Ethernet, and the role of the lines and the connecting devices that make up a network.

**Sample terms** network interface card, cable, hub, router, switch, modem, terminal adapter, modular jack, communication line, transmission path, wireless LAN, Wi-Fi, default gateway, proxy, MAC address, ESSID (Extended Service Set Identifier), mobile communication standard (LTE, etc.), transmission speed (bps: bits per second)

**59. Communications protocol**

**[Goal]**

- Understand the necessity for communication protocols.
- Understand the roles of the typical familiar protocols.

**[Description]**

- ✓ Understand that, to communicate between different system environments, a communication protocol is required, and understand the roles of the typical protocols used on the Internet.

**(1) Communication protocol**

Understand that it is necessary to perform transmission in accordance with common rules to deliver information between the sender and the receiver.

**Sample terms** TCP/IP, HTTP, HTTPS, SMTP, POP, FTP, NTP (Network Time Protocol), DHCP, port number

**60. Network application**

**[Goal]**

- Understand the fundamental mechanism of the Internet and the characteristics of the services.
- Understand the characteristics of communication services and transmission speed.

**[Description]**

- ✓ Understand the fundamental mechanism of the Internet and learn the characteristics of services on the Internet, such as e-mail. Understand the characteristics of communication services that provide means of communications such as the Internet.

**(1) The mechanism of the Internet**

Understand that the computer connected to the Internet is managed by a unique IP address and domain name.

**Sample terms** IP address (IPv6, IPv4, global, private), domain name, DNS, URL

**(2) Internet service**

Understand the characteristics of various services used on the Internet, such as e-mail, Web, and file transfer, and the key points to consider about their utilization.

**Sample terms** broadcast mail, mailing list, mailbox, cc, bcc, cookie, MIME, RSS, online storage, crawler

**(3) Communication service**

Understand the outline of communication service.

**Sample terms** carrier, MVNO (Mobile Virtual Network Operator), ISP (Internet Service Provider), packet communication, mobile communication, IP telephone, ADSL, optical communication, carrier aggregation, dithering, SIM card

**Sample usage** the concepts of packet communication, the concepts of charging by the metered rate system and flat rate system

**Major category 9: Technology element**  
**Middle category 23: Security**

**61. Information security**

**[Goal]**

- Understand the fundamentals of information security from the viewpoint of safe activities in a network society.

**[Description]**

- ✓ Understand that information security is required to collect and utilize information safely. In addition, understand what types of threats and vulnerabilities to information security exist.

**(1) The concepts of information security**

Understand the fundamental concepts and the purpose of information security.

**(2) Information assets**

Understand that there are customer information, sales information, intellectual property related information, and personnel information as typical types of information assets in a company.

**(3) Threat and vulnerability**

Understand the types of typical threats to information security, and the fundamental ways of coping with them. In addition, understand the vulnerability, which is a factor that may cause security incidents or accidents.

**(a) The types and the characteristics of human threats**

Understand the types and characteristics of typical human threats.

**Sample terms** leakage, loss, damage, peep, spoofing, cracking, social engineering, internal fraud, operational error, cyber attack, targeted attack, one-click billing fraud  
**Sample usage** management of information based on information security policies

**(b) The types and characteristics of technical threats**

Understand the types and characteristics of typical technical threats.

**Sample terms** malware (computer virus, bot, spyware, ransomware), worm, Trojan horse, micro virus, Gumblar, key logger, phishing, DoS (Denial of Service) attack, zero-day attack, password crack (dictionary attack, brute force attack), SQL injection, cross-site scripting, security hole, backdoor, file sharing software, password list-based attack, watering hole attack

**(c) The types and characteristics of physical threats**

Understand the types and characteristics of typical physical threats.

**Sample terms** disaster, destruction, sabotage

**62. Information security management**

**[Goal]**

- Understand the fundamental concepts about information security management.

**[Description]**

- ✓ Understand the necessity for risk management. In addition, as part of that, understand the purpose and the fundamental concepts of information security management, as well as protection of personal information.

- (1) **Risk management**  
Understand that risk management is performed in a flow of the identification, analysis, evaluation, and countermeasure of a risk, and that maintenance of manuals and preparations such as education and training are needed to cope with an incident or accident.
- (2) **Information security management**  
Understand the necessity for information security management, and the concepts of ISMS (Information Security Management System).  
**Sample terms** information security policy, information security policy, three major elements of information security management (confidentiality, integrity, availability)
- (3) **Protection of personal information**  
Understand the necessity for protection of personal information and the purpose of measures, such as relevant laws and the Privacy Mark System.

### 63. Information security measures and information security implementation technology

<p><b>[Goal]</b></p> <ul style="list-style-type: none"> <li>➤ Understand the fundamental concepts of the measures for information security, and take minimum necessary measures.</li> <li>➤ Understand the roles of technologies, such as authentication, access control, and encryption required to maintain information security.</li> </ul>
<p><b>[Description]</b></p> <ul style="list-style-type: none"> <li>✓ To take necessary measures appropriately against various threats to information security, understand and take fundamental measures in terms of human, technical, and physical securities.</li> </ul>

- (1) **The types of information security measures**  
Understand the fundamental concepts of human, technical, and physical securities as measures for information security and the security measures that should be implemented at the very least and take the measures.
  - (a) The types of human security measures  
Understand the types of human security measures and apply fundamental measures in familiar business tasks.  
**Sample terms** information security policy, CSIRT (Computer Security Incident Response Team), access privilege  
**Sample usage** the education and training about information security; observance of information security policies, internal rules, and manuals; access controls such as setup of an access privilege
  - (b) The types of technical security measures  
understand the types of technical security measures and apply fundamental measures in familiar business tasks.  
**Sample terms** encryption, authentication technology, ID, password, content filter, callback, access control, firewall, quarantine network, DMZ (demilitarized zone), SSL (Secure Sockets Layer), VPN (Virtual Private Network), digital signature, digital watermark, digital forensics, penetration test, one-time password, single sign-on  
**Sample usage** installation of antivirus software, the update of virus definition files, security setup of an e-mail and a web browser, OS update

(c) The types of physical security measures

Understand the types of physical security measures, and act according to the rules in the organization.

**Sample terms** biometric authentication, surveillance camera, locking management, entrance access control

**Sample usage** entrance access control using ID cards

(2) **Encryption technology**

Understand the fundamental mechanism of encryption technology required to maintain information security and the characteristics of encryption strength.

**Sample terms** common key cryptography, public key cryptography, encryption, decryption

**Sample usage** encryption of wireless LAN using WPA2

(3) **Public key infrastructure**

Understand the basic scheme and characteristics of the public key infrastructure.

**Sample term** PKI (Public Key Infrastructure)

**Information Technology Engineers Examination**  
**— IT Passport Examination (Level 1) —**  
**Syllabus (Version 3.0)**

Information-technology Promotion Agency, Japan  
IT Human Resources Development Headquarters,  
Japan Information-Technology Engineers Examination Center (JITEC)  
15th floor, Bunkyo Green Court Center Office, 2-28-8, Hon-Komagome,  
Bunkyo-ku, Tokyo 113-8663 Japan  
TEL: 03-5978-7600 (main switchboard)  
FAX: 03-5978-7610  
Website: <http://www.jitec.ipa.go.jp>

2015-06