

# Information Technology and its Applications in Business

As per new B Com CBCS syllabus 2017 for CU

**SECOND EDITION**

**Reema Thareja**

*Assistant Professor*

*Department of Computer Science*

*Shyama Prasad Mukherji College for Women*

*University of Delhi*

**OXFORD**  
UNIVERSITY PRESS

# OXFORD

UNIVERSITY PRESS

Oxford University Press is a department of the University of Oxford. It furthers the University's objective of excellence in research, scholarship, and education by publishing worldwide. Oxford is a registered trade mark of Oxford University Press in the UK and in certain other countries.

Published in India by  
Oxford University Press  
Ground Floor, 2/11, Ansari Road, Daryaganj, New Delhi 110002, India

© Oxford University Press 2015, 2017, 2018

The moral rights of the author/s have been asserted.

First Edition published in 2015  
Revised First Edition published in 2017  
Second Edition published in 2018

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior permission in writing of Oxford University Press, or as expressly permitted by law, by licence, or under terms agreed with the appropriate reprographics rights organization. Enquiries concerning reproduction outside the scope of the above should be sent to the Rights Department, Oxford University Press, at the address above.

You must not circulate this work in any other form  
and you must impose this same condition on any acquirer.

ISBN-13: 978-0-19-948929-9  
ISBN-10: 0-19-948929-7

Typeset in TimesNewRomanPS  
by Red Reef Design Studio, Delhi  
Printed in India by Magic International (P) Ltd., Greater Noida

Cover image: © whiteMocca / Shutterstock

Third-party website addresses mentioned in this book are provided  
by Oxford University Press in good faith and for information only.  
Oxford University Press disclaims any responsibility for the material contained therein.

*I dedicate this book to my family  
and  
my uncle Mr B.L. Theraja*

Oxford University Press

# Preface

Information technology (IT) has become an integral part of every business plan. From multi-national corporations who maintain mainframe systems and databases to small businesses that own a single computer, IT plays an important role. One of the main reasons for this is because IT drives innovation and innovation is the path to any business success. In fact, it is safe to say that technology in business has become a growing necessity.

Technology is both a cost of doing business, and an opportunity to do more business. These days, companies are using IT to reach more potential customers, develop a sound relationship with existing customers and business partners, streamline operations, reduce costs, improve efficiency, maximize profit, minimize waste, use talented people to do core business activities than spending their time on doing paper work, and allow customers to better guide the business.

Therefore, in today's scenario learning computers is not meant just for students pursuing a career in engineering and technology, but it is mandatory for students in other professions as well, such as commerce, journalism, nursing, archaeology, construction, and management, to name a few. Computing skills always help one to be more productive and self-sufficient. Therefore, a basic knowledge of computers and related technology will for sure pay dividends in the future.

## ABOUT THE BOOK

*Information Technology and its Applications in Business* has been specifically designed as per the latest syllabus of the University of Calcutta (CU). The book has been written for Commerce students and is an ideal text for self-learning computer concepts. The book also offers a hands-on experience with MS-WORD, POWERPOINT, EXCEL, ACCESS, and HTML.

## KEY FEATURES

- **Pictorial approach** Numerous well-labelled diagrams are provided throughout the text for a clear understanding of the concepts.
- **Practical orientation** Around 100 solved examples are provided that enable the students to check their understanding of the concepts.
- **Comprehensive coverage** The book provides comprehensive coverage of important topics ranging from basic computers to advance technologies.
- **Glossary** A list of key terms is provided at the end of each chapter that facilitates revision of important topics learned.
- **Notes** Important concepts are provided in between the text for a quick recap.
- **Lab activities** The book has a separate section on lab activities that includes practicals in MS-OFFICE and HTML.
- **One-to-one mapping with syllabus** The content of the book has a direct mapping with the syllabus prescribed by the University of Calcutta for Commerce students.
- **Multiple-choice questions** The book contains more than 650 multiple-choice questions with answers to help students test the concepts and gain confidence in the subject.

## ORGANIZATION OF THE BOOK

The book is designed in ten chapters, with the first five dealing with theory and the last five dealing with practicals.

**Chapter 1** distinguishes among data, information, and knowledge. It discusses the impact of IT in business including business data processing, intra- and inter-organizational communication by using network technology, BPOs, and KPOs. The chapter also discusses different types of information systems such as the TPS, MIS, DSS, and the KMS.

**Chapter 2** gives a briefing of traditional file-oriented approach of data management and introduces the concept of databases, their architecture, models, and components. It also illustrates how data can be fetched from tables using query language. The chapter introduces three important technologies—data warehousing, data mining, and big data analysis—which have revolutionized the way in which massive amounts of data are stored and analysed.

**Chapter 3** talks about the Internet and introduces key terms such as IP address, URL, DNS, IP, TCP, FTP, UDP, TELNET, HTML, DHTML, and XML. The chapter also unleashes the concepts of ethical hacking, cloud computing, mobile computing, Internet of Things, and ethical issues in social networking which are very important in today's scenario.

**Chapter 4** brings forward threats to data security such as malware including virus, worms, spyware, adware, Trojan horse, and ransomware. Different types of attacks such as hacking, spoofing, sniffing, phishing, spamming, and denial of service (DoS) attacks are also discussed. Preventive measures such as firewalls, data encryption, digital certificates, digital signature, digital envelope, firewall, DMZ, SSL, HTTPS are detailed in the chapter. A very important concept—website audit—is also introduced.

**Chapter 5** gives an overview of the IT Act 2000 and describes digital signature, electronic governance, attribution, acknowledgement and dispatch of electronic records, regulation of certifying authorities, digital signature certificates, duties of subscribers, penalties and adjudication, appellate tribunal, offences, and cybercrimes to create an awareness of how sensitive it can be to use the internet for causing any kind of harm to anyone.

## Practical Unit

**Chapter 6** teaches the students how to work with MS Word. Topics such as editing text, finding and replacing text, formatting, performing spell check and autocorrect, auto text, including the following elements—bullets and numbering, header and footer, macros, drop cap, inserting tables, filling and formatting a table, inserting pictures and video; performing mail merge, including linking with database, and printing documents have been covered in detail with screenshots.

**Chapter 7** will help the reader to make beautiful presentations in MS PowerPoint. Slides, fonts, drawing, editing, design, transition, animation, hyperlink, slideshow, and inserting the following elements in a slide—tables, images, text, symbols, media have been discussed in detail.

**Chapter 8** is one of the most important chapters for B Com students as it gives a sound knowledge of managing worksheets for day-to-day business activities. The chapter entails concepts such as formatting worksheets, entering data, editing, printing worksheets, handling operators in formula, organizing charts, graphs, and pivot tables. Concepts such as loan and lease statement, ratio analysis, payroll statements, capital budgeting, depreciation accounting, frequency distribution and its statistical parameters, and correlation and regression are also detailed in the chapter.

**Chapter 9** is an extension to Chapter 2 as it helps the reader to practically implement the concepts learnt in Chapter 2 in MS Access. For this, the chapter includes creation of tables, defining foreign key, executing simple and conditional queries to update, delete, and append records, design forms, and generate reports. The chapter also introduces SQL through basic commands and briefly describes how DBMS can be applied in the areas of accounting, inventory, and HRM and also in managing the data records of employees, suppliers, and customers.

**Chapter 10** introduces web designing with HTML. The chapter discusses tags, attributes, text formatting, fonts, hypertext links, tables, images, lists, forms, frames, cascading style sheets with screenshots to observe the output and better understand the concepts.

## ACKNOWLEDGMENTS

The writing of this textbook was a mammoth task for which a lot of help was required from many people. Fortunately, I have had the fine support of my family, friends, and fellow members of the teaching staff at the Institute of Information Technology and Management.

My special thanks would always go to my father Shri Janak Raj Thareja, my mother Smt. Usha Thareja, my brother Pallav, and sisters Kimi and Rashi, who were a source of abiding inspiration and divine blessings for me. I am especially thankful to my son Goransh who has been very patient and cooperative in letting me realize my dreams. My sincere thanks go to my uncle Mr B.L. Theraja for his inspiration and guidance in writing this book.

Last but not the least, my acknowledgements will always be incomplete if I do not thank the editors at Oxford University Press, India who have supported my creative writing activities over the past few years.

**Reema Thareja**

# Contents

*Preface* iv

*Syllabus–Chapter Topics Mapping* xi

## **1. Information Technology and Business**

**I**

1.1 Concepts of Data, Information, and Knowledge	1
1.1.1 Features of Data	1
1.1.2 Features of Information	2
1.1.3 Features of Knowledge	2
1.1.4 Characteristics of Information	3
1.2 Impact of Information Technology on Business	3
1.2.1 Business Data Processing	4
1.2.2 Enhanced Intra-organizational and Inter-organizational Communication	5
1.2.3 Outsourcing	7
1.3 Types of Information Systems	10
1.3.1 Why are There Different Types of Information Systems?	10
1.3.2 Implementation of IS at Managerial Level (Operational, Tactical, and Strategic)	10

## **2. Data Organization and Database Management System**

**20**

2.1 Introduction	20
2.2 Data Organization	20
2.3 Data Processing System	21
2.3.1 Batch Processing System	21
2.3.2 Online Processing	22
2.3.3 Real-time Processing	22
2.3.4 Serial Processing	22
2.3.5 Centralized Processing	23
2.3.6 Decentralized or Distributed Processing	23
2.4 File Organization	23
2.4.1 Sequential Organization	24
2.4.2 Relative File Organization	26
2.4.3 Indexed Sequential File Organization	27
2.5 File-Oriented Approach	28
2.6 Database Approach	29
2.7 File-Oriented Vs Database-Oriented Approach	30

2.8 Concept of Database Management System	31
2.9 Components of Database Management System	32
2.10 Database Views	33
2.11 Three-Schema Architecture	34
2.12 Database Models	35
2.12.1 Hierarchical Model	36
2.12.2 Network Model	37
2.12.3 Relational Model	38
2.12.4 Object-oriented Data Model	39
2.13 Key Terms	39
2.14 Retrieving Data Through Queries	42
2.15 Data Warehouse	43
2.15.1 Subject-oriented Data	44
2.15.2 Integrated Data	44
2.15.3 Non-volatile Data	45
2.15.4 Time-variant Data	45
2.16 Data Mining	47
2.16.1 What can be Discovered?	48
2.17 Data Mining and Data Warehouse	49
2.17.1 Data Mining—A Data Warehouse Tool	50
2.17.2 Applications of Data Mining	50
2.17.3 Benefits of Data Mining	51
2.17.4 Disadvantages of Data Mining	51
2.18 Big Data	52
2.18.1 History and Evolution of Big Data Analytics	53
2.18.2 Benefits of Big Data	53
2.18.3 Applications of Big Data	53

## **3. Internet and its Applications**

**64**

3.1 Introduction	64
3.1.1 History	64
3.2 Internet Services	65
3.2.1 Electronic Mail	65
3.2.2 File Transfer Protocol	66
3.2.3 Chatting	66
3.2.4 Internet Conferencing	66

3.2.5 Electronic Newspaper	67	4.13.4 HTTPs	123
3.2.6 World Wide Web	67	4.14 Website Audit	125
3.2.7 Online Shopping	67		
3.3 Internet Protocol Address	68	<b>5. IT Act 2000 and Cybercrimes</b>	<b>137</b>
3.3.1 Types of IP Addresses	68	5.1 Information Technology Act 2000	137
3.4 Domain Name System	70	5.2 Salient Features of It Act	137
3.5 Uniform/Universal Resource Locator	71	5.3 Definition	138
3.6 Internet Protocols	72	5.3.1 Amendments to IT Act	139
3.6.1 Internet Protocol	73	5.4 Digital Signature	139
3.6.2 Transmission Control Protocol	74	5.5 Electronic Governance	140
3.6.3 User Datagram Protocol	74	5.6 Attribution, Acknowledgment, and Dispatch of Electronic Records	141
3.6.4 File Transfer Protocol	75	5.7 Regulation of Certifying Authorities	142
3.6.5 Terminal Emulation	77	5.8 Digital Signature Certificates	143
3.6.6 Hypertext Markup Language	78	5.9 Duties of Subscribers	145
3.6.7 Dynamic HTML	79	5.10 Penalties and Adjudication	146
3.6.8 Extensible Markup Language	80	5.11 Cyber Regulations Appellate Tribunal	147
3.7 Hacking and Ethical Hacking	81	5.11.1 Establishment	147
3.8 Mobile Computing	83	5.11.2 Composition	148
3.9 Internet of Things	85	5.11.3 Qualifications for Appointment as Presiding Officer of Cyber Appellate Tribunal	148
3.10 Ethical Issues in Social Networking	87	5.11.4 Term of Office	148
<b>4. Security and Encryption</b>	<b>98</b>	5.11.5 Salary, Allowance, and Other Terms of Service of Presiding Officer	148
4.1 Need and Concepts	98	5.11.6 Filling-up of Vacancies	148
4.1.1 Dimension	99	5.11.7 Resignation and Removal	148
4.2 Definition and Scope of E-Security	100	5.11.8 Orders Constituting Appellate Tribunal to be Final and not Invalidate Proceedings	148
4.3 Threats to Data Security	101	5.11.9 Staff of Cyber Appellate Tribunal	148
4.3.1 Malware	101	5.11.10 Appeal to Cyber Regulations Appellate Tribunal	149
4.3.2 Spyware	106	5.11.11 Procedure and Powers	149
4.3.3 Adware	106	5.11.12 Right to Legal Representation	150
4.4 Network Attacks	106	5.11.13 Civil Court Not to Have Jurisdiction	150
4.4.1 Browser Hijacking	107	5.11.14 Appeal to High Court	150
4.4.2 Denial-of-Service Attack	107	5.11.15 Compounding of Contraventions	150
4.4.3 Man-in-the-middle Attack	107	5.11.16 Recovery of Penalty	150
4.5 Internet Fraud	108	5.12 Offences and Cybercrimes	150
4.6 Ransomware	109	5.12.1 Tampering with Computer Source Documents	151
4.7 Hacking	112	5.12.2 Hacking with Computer System	151
4.8 Spoofing	113	5.12.3 Punishment for Sending Offensive Messages through Communication Service	151
4.9 Sniffing	113	5.12.4 Punishment for Dishonestly Receiving Stolen Computer Resources or Communication Devices	151
4.10 Phishing	114	5.12.5 Punishment for Identity Theft	152
4.11 Spamming	115	5.12.6 Punishment for Cheating by Personation by Using Computer Resource	152
4.12 Technology Solutions	116		
4.12.1 Data Encryption and Decryption	116		
4.12.2 Symmetric and Asymmetric Encryption	117		
4.13 Security Implementation	119		
4.13.1 Firewalls	119		
4.13.2 Demilitarized Zone (DMZ)	120		
4.13.3 Secure Socket Layer	121		



5.12.7	Punishment for Violation of Privacy	152
5.12.8	Publishing of Information which is Obscene in Electronic Form	152
5.12.9	Power of Controller to Give Directions	152
5.12.10	Directions of Controller to Subscriber to Extend Facilities to Decrypt Information	153
5.12.11	Protected System	153
5.12.12	Penalty for Misrepresentation	153
5.12.13	Breach of Confidentiality and Privacy	153
5.12.14	Penalty for Publishing Digital Signature Certificate Falsely in Certain Particulars	153
5.12.15	Publication for Fraudulent Purpose	154
5.12.16	Act to Apply for Offence or Contravention Committed outside India	154
5.12.17	Confiscation	154
5.12.18	Penalties and Confiscation Not to Interfere with Other Punishments	154
5.12.19	Power to Investigate Offence	154

## **6. Elements of Word Processing 161**

6.1	Introduction	161
6.2	Opening, Printing, and Closing Documents	161
6.2.1	Opening Documents	162
6.2.2	Save and Save As	163
6.2.3	Page Setup	163
6.2.4	Print Preview, Printing and Closing Documents	164
6.3	Text Creation and Manipulation	166
6.3.1	Document Creation	166
6.3.2	Text Editing	166
6.3.3	Text Selection	167
6.3.4	Cut, Copy, and Paste	168
6.3.5	Font and Size Selection	169
6.3.6	Alignment of Text	170
6.3.7	Changing Font Colours	170
6.3.8	Highlighting Text with Colours	171
6.3.9	Applying Text Effects	171
6.3.10	Inserting WordArt	172
6.4	Formatting the Text	172
6.4.1	Paragraph Indenting	173
6.4.2	Line and Paragraph Spacing	173
6.4.3	Bullets and Numbering	175
6.4.4	Case Changing	176
6.4.5	Finding and Replacing Text	176
6.4.6	Spell Check	177

6.4.7	Checking Grammar	178
6.4.8	Auto Correct	178
6.4.9	AutoText	179
6.5	Headers and Footers	180
6.6	Macros	181
6.7	Drop Cap	182
6.8	Table Manipulation	183
6.8.1	Drawing Table	183
6.8.2	Changing Cell Width and Height	184
6.8.3	Alignment of Text in Cell	185
6.8.4	Deleting/Inserting a Row/Column in a Table	185
6.8.5	Borders and Shading	187
6.8.6	Merging Cells	188
6.8.7	Splitting Cells	188
6.8.8	Adjusting Cell Size by Dragging	189
6.8.9	Cell Margins	189
6.8.10	Changing the Direction of Text in Table	190
6.9	Inserting Pictures	190
6.10	Inserting Shapes	192
6.11	Inserting Text Box	195
6.12	Mail Merge	195
6.12.1	Creating Envelopes and Labels	197

## **7. Applications of Presentations 202**

7.1	Introduction	202
7.2	Basics	202
7.2.1	Using PowerPoint	202
7.2.2	Opening a PowerPoint Presentation	205
7.2.3	Saving a Presentation	206
7.3	Creation of Presentation	206
7.3.1	Creating a Presentation Using a Template	206
7.3.2	Creating a Blank Presentation	207
7.3.3	Entering and Editing Text	208
7.3.4	Inserting and Deleting Slides in a Presentation	208
7.4	Preparation of Slides	210
7.4.1	Inserting Word Table or an Excel Worksheet	210
7.4.2	Inserting Pictures in Slides	211
7.4.3	Inserting Other Objects	213
7.4.4	Resizing and Scaling an Object	214
7.5	Providing Aesthetics	215
7.5.1	Enhancing Text Presentation	215
7.5.2	Working with Color and Line Style	215

7.5.3	Adding Movie and Sound	217
7.5.4	Adding Headers or Footers	217
7.6	Presentation of Slides	218
7.6.1	Viewing a Presentation	218
7.6.2	Choosing a Set-up for Presentation	219
7.6.3	Printing Slides and Handouts	221
7.7	Slide Show	222
7.7.1	Running a Slide Show	222
7.7.2	Setting the Timing and Speed of a Transition	222
7.7.3	Automating a Slide Show	223

## **8. Spreadsheet 228**

8.1	Introduction	228
8.2	Elements of Electronic Spreadsheet	228
8.2.1	Opening a Spreadsheet	230
8.2.2	Addressing Cells	231
8.2.3	Printing Spreadsheets	231
8.2.4	Saving Workbooks	231
8.3	Manipulation of Cells	233
8.3.1	Entering Text, Numbers, and Dates	233
8.3.2	Creating Text, Number, Date, Time, Weekdays, Months, or Years Series	234
8.3.3	Editing Worksheet Data	234
8.3.4	Inserting New Worksheet	236
8.3.5	Inserting or Deleting Cells, Rows, and Columns	236
8.3.6	Changing Column Width and Row Height	237
8.3.7	Formatting Rows, Columns, and Sheets	238
8.3.8	Protecting and Un-protecting Cells, Rows, Columns, and Sheets with or without Password	241
8.3.9	Hiding/Unhiding Rows, Columns, and Sheets	242
8.4	Functions and Charts	243
8.4.1	Formulas	243
8.4.2	Functions	246
8.5	Pivot Tables	266
8.5.1	Charts	266
8.6	Other Applications of Spreadsheets	270
8.6.1	Ratio Analysis	270
8.6.2	Payroll Statements	271
8.6.3	Capital Budgeting	271
8.6.4	Depreciation	272
8.6.5	Frequency Distribution and Statistical Parameters	272

## **9. MS Access: A Database Management System 277**

9.1	Introduction	277
9.2	Creating Databases	277
9.2.1	Creating Database using Design Template	278
9.2.2	Creating a Blank Desktop Database	279
9.3	Data Types in Ms Access	280
9.4	Tables in Ms Access	281
9.4.1	Creating Tables in Datasheet View	281
9.4.2	Creating Tables in Design View	283
9.4.3	Defining Relationship among Multiple Tables	284
9.5	Query Object	286
9.5.1	Creating Queries using Query Wizard	286
9.5.2	Creating Queries using Query Design	287
9.6	Form Object	291
9.6.1	Creating Forms using Form Command	291
9.6.2	Creating Forms using Split Form	292
9.6.3	Creating Forms using Form Wizard	292
9.7	Report Object	293
9.7.1	Creating Reports using Report Command	293
9.7.2	Creating Reports using Report Wizard	294
9.8	Introduction to SQL through Basic Commands	295
9.9	Application of DBMS	297

## **10. Website Designing - HTML 303**

10.1	Introduction	303
10.2	Structure of HTML Page	303
10.2.1	Formatting Elements in HTML	305
10.3	Lists in HTML	311
10.4	Frames and Frameset in HTML	313
10.5	Other Tags	316
10.5.1	Input Tag	316
10.5.2	Form Tag	316
10.5.3	Link Tag	318
10.6	Cascading Style Sheets	318
10.6.1	Methods of Specifying CSS	318
10.6.3	Ways of Inserting a Style Sheet	321
10.6.4	Cascading Order (Priority) of Styling	324

About the Author 331

Related Titles 332

# Syllabus–Chapter Topics Mapping

S. No.	Topic	Chapter No.
<b>MODULE I</b>		
1.	<b>Information Technology and Business:</b> Concepts of data, information and computer-based information system, impact of information technology on business [business data processing, intra-organizational and inter-organizational communication by using network technology, business process outsourcing and knowledge process outsourcing], types of information system—Transaction Processing System (TPS), Management Information System (MIS), Decision Support System (DSS), Knowledge Management System (KMS) and their implementation at managerial levels [operational, tactical and strategic].	1
2.	<b>Data Organization:</b> Character, field, record, file and database, types of data processing systems [Serial, Batch, Real-time, Online, Centralized, Distributed], File organizations [Sequential, Direct, Indexed–Sequential, Relative], Traditional file organization vs database file organization. <b>Database Management System:</b> Concept of database management system (DBMS), definition, importance of DBMS, important terms of database [Entity, Attribute, Keys—Primary, Foreign, and Candidate, Referential Integrity, Table, Views, Data Dictionary], types of database [Hierarchical, Network, and Relational], basic ideas of data warehouse and data mining (definition, importance, advantages, and disadvantages), Big data analysis—Concept.	2
3.	<b>Internet and its Applications:</b> Meaning of Internet, IPAddress [IPv4, IPv6], URL, Domain Name System, Internet Protocols—TCP/IP, UDP, FTP, TELNET[brief ideas only], HTML, DHTML, AND XML [Concepts only], Ethical hacking, Cloud computing, Mobile computing, Internet of things, Ethical issues in social networking.	3
4.	<b>Security and Encryption:</b> Need and concepts, dimension, definition and scope of e-security, security threats—Malicious codes (Virus, Trojan Horse, Worm, Spyware, Ransomware), Hacking, Spoofing, Sniffing, Phishing, Spamming, Denial of Service (DoS) attacks, Technology solutions [Confidentiality: (Data Encryption & Decryption, Symmetric and asymmetric encryption), Security Implementation: Firewall, DMZ (De Militarized Zone), SSL, HTTPs, Significance of Website Auditing].	4
5.	<b>IT Act 2000 and Cybercrimes:</b> IT Act 2000—Definitions of different terms, Digital signature, Electronic Governance, Attribution, Acknowledgement and Dispatch of Electronic Records, Regulation of Certifying Authorities, Digital Signatures Certificates, Duties of Subscribers, Penalties and Adjudication, Appellate Tribunal, Offences and Cybercrimes.	5

MODULE II		
6.	<b>Word Processing:</b> Working with word documents—Editing text, Find and Replace text, Formatting, Spell check, Autocorrect, Auto text; Bullets and numbering, Tabs, Paragraph formatting, Indent, Page formatting, Header and footer, Macros, Drop cap; Tables: Inserting, Filling and formatting a Table, Inserting Pictures and Video; Mail Merge—including linking with database, printing documents. Creating business documents using the above facilities.	6
7.	<b>Preparing Presentations:</b> Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation, Hyperlink and Slideshow. Creating Business Presentations using above facilities.	7
8.	<b>Spreadsheet and its Business Applications:</b> Managing worksheets—Formatting, Entering data, Editing, and Printing a worksheet; Handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs, Pivot Table. Spreadsheet Functions: Mathematical [SUMIF, SQRT, SUBTOTAL, SUMPRODUCT etc.], Statistical [AVERAGE, STDEV, VAR, CORRELATION, REGRESSION etc.], Financial [PMT, RATE, PV, FV, NPV, IRR, NPV, Data Table Etc.], Logical [AND, OR, IF etc.], Date and time, Lookup and reference, Database and Text functions. Creating Spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll Statements; Capital Budgeting; Depreciation Accounting; Graphical Representation of Data; Frequency Distribution and its Statistical Parameters; Correlation and Regression.	8
9.	<b>Database Management System:</b> Creation of Tables, Multiple Table Handling—Defining Relationship [Foreign Key], Simple and Conditional Queries, Types of Queries [Update, Delete, Append], Forms, Reports, Introduction to SQL through Basic Commands. Applying DBMS in the areas of Accounting, Inventory, HRM and its accounting, Managing the data records of Employees, Suppliers, and Customers.	9
10.	<b>Website Designing:</b> Introduction to HTML; Tags and Attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms, Frames, Cascading Style Sheets.	10

# Information Technology and Business

Syllabus Mapping	Unit
Concepts of data, information and computer based-information system, impact of information technology on business [business data processing, intra-organizational and inter-organizational communication by using network technology, business process outsourcing and knowledge process outsourcing], types of information system- transaction processing system (TPS), management information system (MIS), decision support system (DSS), knowledge management system (KMS) and their implementation at managerial levels [operational, tactical and strategic].	Module I Unit I

## 1.1 CONCEPTS OF DATA, INFORMATION, AND KNOWLEDGE

The two words *data* and *information* are often used interchangeably but are actually not the same. While data is a collection of raw facts or figures, information comprises processed data to provide answers to the *who*, *what*, *where*, and *when* type of questions. There is one more important term that we must learn before going into the details, namely *knowledge*. Knowledge is the application of data and information to answer the *how* part of the question. The relationship among data, information, and knowledge can be clearly understood from Figure 1.1.

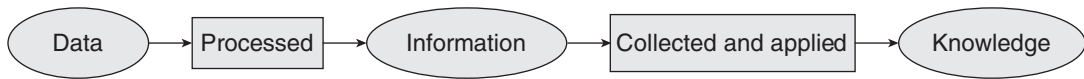
### 1.1.1 Features of Data

The features of data are listed here:

- Consists of raw facts or figures.
- Consists of unorganized and unprocessed facts.
- May be a simple statement.
- Can exist in any form, usable or not.
- Does not have any significance unless processed to derive information.
- Is obtained from experiments or surveys.
- Is used as a basis for making calculations or drawing conclusions.
- Can exist as numbers, text, images, sounds, and so on.
- An organization, sometimes, has to decide on the nature and volume of data that is required for deriving information. For example, date of birth of a person, salary of a customer, price of an item, and so on.



In the business world, data usually exists in the form of spreadsheets.



**Figure 1.1** Data, information, and knowledge

### 1.1.2 Features of Information

The features of information are as follows:

- Consists of processed data.
- May be the collected facts and data about a particular subject.
- May be collected data, organized and presented in a systematic fashion, to understand the underlying meaning. For example, a telephone service may supply telephone numbers to a loan finance company. Here, the collected data (numbers), when collected and organized to be used by the company, becomes information.
- Embodies the understanding of certain relationships, possibly cause and effect. For example, whether a person with a given date of birth is eligible to vote, whether a customer with a specified salary is able to afford the product, and so on.

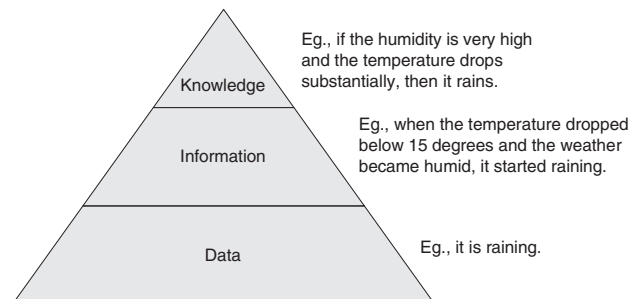
### 1.1.3 Features of Knowledge

The features of knowledge are as follows:

- Comprises human understanding of a subject matter that has been acquired through proper study and experience.
- Is based on learning, thinking, and proper understanding of the problem area.
- Makes the information more usable.
- Is a deterministic process.
- Represents a pattern that connects the pieces of information together.
- Provides a high level of predictability to explain what happened in the past and what will happen next.
- Comprises all the data and information learned through experience or study.
- Helps people draw meaningful conclusions. For example, how to market the product, so that it sells more.

Figure 1.2 shows the data, information, and knowledge (DIK) pyramid, in which data forms the basis of information and knowledge.

**Example 1.1** If we know that Kellogg's cornflakes are too costly to be bought by a daily wage earner, a small packet of ₹10 can be introduced in the market, which he can purchase. Here, data comprises the price of the cornflakes and the wages of the labourer. Information is that he cannot afford to buy branded cornflakes. Knowledge is to reduce the price and weight, to make it affordable for him.



**Figure 1.2** The DIK pyramid



Knowledge is not information and information is not data. Knowledge is derived from information, which, in turn, is derived from data.

### 1.1.4 Characteristics of Information

To be useful, information must possess certain characteristics, as shown in Table 1.1.

**Table 1.1** Characteristics of information

Characteristics	Utility	Examples of unusable information
Relevance	Information must pertain to the problem at hand. It should be applicable in that context.	The monthly income of a candidate's father is irrelevant for appearance in the CA examination.
Complete	Partial information is worse than no information.	To market a product, the marketing team must have information about customer buying patterns as well as their incomes. If a product is promoted to high-income group customers, who usually do not prefer to buy it, it often leads to wastage of time and effort.
Accurate	Erroneous information may result in wrong decisions.	If the consumer survey gives wrong information about users' preferences, then the decisions taken, in light of the survey results, will be always wrong.
Current	The information used must be recent and the latest.	A person cannot buy a stock today, referring to the price and profit margin of that stock on a previous date.
Economical	The cost of obtaining information should not be so high that it cannot be justified.	If the cost of conducting a survey about a new product is too high, then it may diminish the profit from sales.

## 1.2 IMPACT OF INFORMATION TECHNOLOGY ON BUSINESS

Businesses have been at the forefront of technology for ages. Whatever can speed up the production process will draw in more business. With the widespread use of computers, a new age of information technology (IT) has begun. To reap its benefits, businesses are rapidly changing their infrastructure. These days, almost every business is conducted over computers and communication devices, in order to organize large databases, personal schedules, and various other forms of essential information.

Information technology is a comprehensive term that includes all types of technology used to exchange, store, use, or create information. Commonly used devices to support IT include computers, servers, peripheral devices, Internet connectivity equipment, and phone systems. Breakthrough in IT has resulted in better or automated solutions that have not only increased the productivity, but also



involve lower operational costs, improved speed, ease of sharing and storing information, decrease in human error through automation, and increase in revenue.

IT is rapidly permeating the business world, affecting how companies make and market their products, as well as how people communicate and accomplish their jobs. Specialized software shapes best-practices and industry standards, continually changing the face of business in almost every way. Let us see how the use of IT has revolutionized the way we do our business.

### **1.2.1 Business Data Processing**

Business data processing (BDP) means performing operations in order to convert business data into useful information. IT enables businesses to store large amounts of information, summarize them, and analyse them, in order to understand the business in a better way. Once data is entered into a spreadsheet application, users can draw a variety of charts to interpret the data from different angles. For example, view the sales of a product in a particular region during the entire year, view the sales of a product in all the regions in a particular month, and the like.

Another example could be from banking. Banks store records of millions of users and keep complete information about their accounts, loans, fixed deposits, and so on. They keep sending statements and other promotional schemes to their customers from time to time.

Other areas in which IT has a major impact on BDP include:

#### **Accounting and Payroll**

Businesses can use software accounting packages, like Microsoft Money or QuickBooks to manage their accounts. No longer do they need to hire full-time or third-party accountants. These software packages enable business managers to generate informative reports and financial statements, in order to make effective business decisions. Accounting systems keep track of every rupee a company spends, along with every rupee of revenue.

The accounting software also stores payroll information, tax records, and other specialized data. Business without these software packages cannot be even imagined today. Besides increasing efficiency, IT also reduces time and space required to store a large number of files with hundreds of papers in it. Can you think of searching information from these files?

#### **Inventory Management**

Businesses can use software packages like Microsoft Excel or Open Office to store data, pertaining to inventory, sales, and receivables and payables. The inventory management system keeps track of products in the inventory and ensures that the business neither runs out of stock nor is in excess.

#### **Enhanced Productivity**

Technology tools help employees do their tasks quickly and efficiently in very less time, and that too without any error. Therefore, empowering employees with the right hardware and updated software keeps them working at their best.

#### **Easier Storage**

Information technology eliminates the need for double or triple entry systems and reduces paperwork to a considerably large extent. Details about contracts, quotations, customers, suppliers, dealers, retailers, and so on can all be stored in databases and accessed in minutes.



## Automation

With technology, businesses can automate certain functions that have historically required the need to hire an employee. They can use software like Quicken and Quickbooks to perform frequent book-keeping functions. Similarly, the sales function can be automated through contact management sites like Salesforce. Using automated software enables business managers to concentrate on strategy and cut down on labour expenses. Automation technology, such as assembly lines and computer-controlled machinery, enables industries and organizations to produce large volumes of goods in less time and at low cost.

## Economic Efficiencies

Companies can harness IT resources to lower their costs. Using IT infrastructure, redundant tasks can be centralized at one location. For example, a large company could centralize their payroll function at one location to lower employee costs. Economic efficiencies can also be realized by migrating high-cost functions into an online environment. Companies can offer customers email support, which may have a lower cost than a live customer support call. Cost savings can also be made through outsourcing opportunities, remote work options, and lower-cost communication options.

### 1.2.2 Enhanced Intra-organizational and Inter-organizational Communication

With IT, an organization can be benefitted from faster, efficient, effective, and low-cost communication systems, as explained in this section.

## Internet Marketing

Today, all businesses are moving towards making their presence felt on the Internet. Whether big or small, all businesses have their websites to advertise their products, take orders, buy merchandise, and sell excess products. Many businesses such as Flipkart, Amazon, Snapdeal, OLX, and so on, operate only online. Some businesses are also doing Internet marketing on other social websites. For example, we all have seen advertisements of products on Facebook.

With enhanced communication (Figure 1.3), companies are able to build strong relationships within their value chains. As a result, with extensive use of technology, even a small business can compete with established and big business houses. Using advanced video and graphics editing software, business owners create professional marketing materials that reach out to millions of netizens worldwide. They use cost-efficient web marketing tools like Google AdWords to spread targeted marketing messages, either to a broad audience or to a selected group. Business owners also share expensive advertising space online through banner- and traffic-swaps.

Additionally, through email marketing, business managers are effectively reaching out to a large group of people with newsletters, coupons, or other means of business updates, and that too at very low costs. Going a step ahead, they have also started using mobile marketing to offer discounts to customers, through text messaging and by advertising their products and services. Undoubtedly, technology has freed small businesses from the restrictions of print advertisements to reach out to their customers. IT has helped businesses minimize geographic communication barriers.



**Figure 1.3** Enhanced communication

Technology has brought businesses closer to customers. Businesses use emails to reply to customers' queries, get their feedback, offer online chat to help them navigate through their websites, and use call centers to support their customers every moment.

### Stay Competitive

To survive in the marketplace, every business is racing to get the technology tag. Using Internet and online surveys, business managers stay up-to-date with recent trends, techniques, software, and human resources. Managers communicate with their employees in different locations, resolve both employee and customer issues in almost no time, and keep track of their status as well as competitors' positions through different postings on the web.

With better communication, business managers can manage their time better, freeing themselves from administrative minutiae and focusing on more productive activities, such as making vital contacts with suppliers and potential strategic partners. Business managers and entrepreneurs can hold *face to face* meetings online, from anywhere in the world. For example, IndusInd bank has started mobile face-to-face banking.



Companies with first mover strategy use IT to create new products that give them a cutting edge.

### Improved Sharing of Information

With technology, any type of information—written or broadcast—can be shared more quickly and with fewer resources. Besides sharing information about new products with customers, IT also helps send inventory orders, make payments, and invite quotations online. Information technology also enables companies to get into e-learning and other forms of online training to train their staff in a cost-effective manner.

### Customer Relationship Management

A customer relationship management (CRM) system is used to track a customer throughout his experience or interaction with the business. Managers can view the information about how many times the customer has called to order a product or service, for help, with a technical question, or for any other conversation. All these details help to build strong relationships with customers, by providing them with customized and proactive responses.

### Telecommuting, Teleconferencing, and Videoconferencing

Business houses are using telecommuting to help employees stay in touch with each other from different locations. Employees use email, online collaboration tools, and mobile computing devices to share digital documents, convey information through presentations, and create training videos for new joiners.

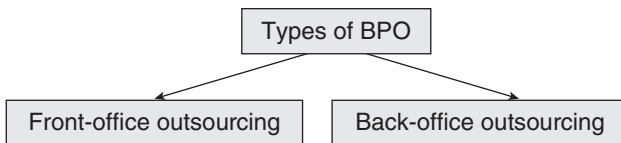
Teleconferencing over the phone and video brings together web cameras and audio and collaborative online meeting spaces to create an interactive environment, in which the participants can see each other, work together on documents, and recreate the in-person meeting experience, no matter where they are in the world. This enables businesses to reach global customers and partners.



Nowadays, a business that is not conducted online or one that has an outdated and unattractive-looking website is considered to be unprofessional.

### 1.2.3 Outsourcing

The term *outsourcing* implies hiring employees who work outside the company. These employees may even reside in some other country. These days, we frequently hear that people are working in business process outsourcing (BPO) or knowledge process outsourcing (KPO). In this section, we will discuss these two forms of outsourcing and understand the underlying difference between the two.



**Figure 1.4** Types of BPO

focusing on routine business tasks. The BPO service that is outsourced to another country is called *offshore outsourcing*, while the one outsourced to a neighboring country is called *nearshore outsourcing*. Similarly, the BPO service that is outsourced within the same country is called *onshore outsourcing*.

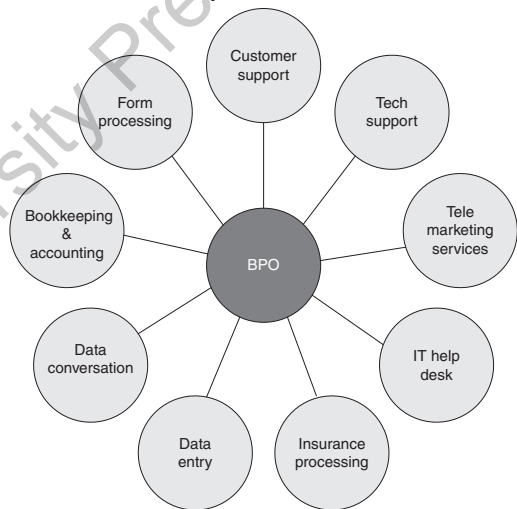
There are two main types of BPOs (as shown in Figure 1.4), which are front-office outsourcing and back-office outsourcing. While in back-office outsourcing, internal business functions such as payroll, billing, purchasing, accounting, and HR are outsourced, in front-office outsourcing, customer-related services such as marketing and technical support are outsourced, as shown in Figure 1.5.



Call centre jobs are BPO jobs.

### Business Process Outsourcing

Business process outsourcing is the practice in which employees outside the company are hired to perform specific business tasks like payroll. Outsourcing is done as a cost-saving measure by big companies that want to focus on their key business area, rather than



**Figure 1.5** Services provided by BPO

**Advantages** The main advantages of BPOs are as follows:

- Companies can focus on their specialized areas and specific competencies.
- Speed and efficiency of routine business tasks enhance when these jobs are outsourced to a third party.
- All the employees of the company can concentrate in designing and implementing the core business strategies to bolster competitive advantage and enhance value chain engagement.
- Companies in developed nations usually outsource their routine tasks to developing nations, where they have to pay very little for the same job, thereby helping to cut involved costs.

**Risks** There are, however, certain serious risks that exist while outsourcing business processes. These are as follows:

- Data privacy breaches can take place.
- There can be underestimated running costs.
- There can be overdependence on service providers.

## Knowledge Process Outsourcing

Knowledge process outsourcing is another form of outsourcing, in which a company outsources core business activities competitively important or form an integral part of its value chain. It requires advanced analytical and technical skills, as well as a high degree of specialist expertise. The KPO services include all kinds of research and information gathering activities like intellectual property research for patent applications, equity research, business and market research, legal and medical services, training, consultancy, and research and development in fields such as pharmaceuticals, biotechnology, animation and design, web development, CAD/CAM applications, fraud analytics, project management, remote education, research and development, radiology, and medical transcript preparation, as shown in Figures 1.6 and 1.7.



Figure 1.6 Services provided by KPO

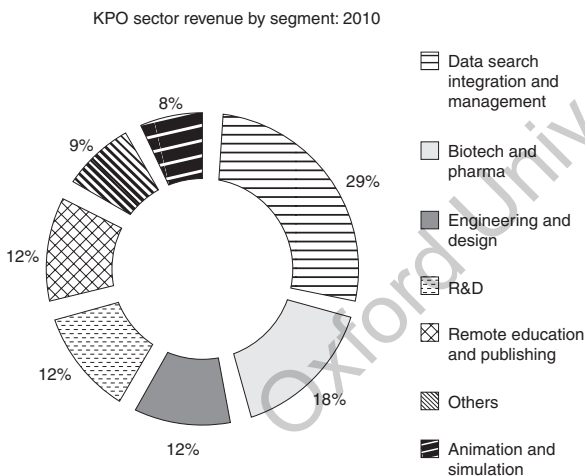


Figure 1.7 KPO sector services

The KPOs basically exist not only as a measure of cost reduction, but also as a compensation for shortage of skilled labour. Developed nations such as UK, US, Canada, and England see developing countries such as India, Sri Lanka, Chile, Mexico and Eastern Europe, especially Poland, Romania, and the Baltic States, as suitable regions to set up a KPO.

A KPO extends the work of a BPO by adding more business complexities. It is always recommended that only a company that has a good knowledge of running a BPO must get into the KPO market.

**Advantages** The main advantages of KPOs are as follows:

- They reduce cost.
- They compensate for shortage of skilled employees.
- They offer low cost expertise.
- They offer employment for educated people in developing countries and benefits of their economies.
- They add value to the company's core competencies.

**Risks** There are, however, certain risks that involve in KPOs. These are as follows:

- Important data of the company is passed to a third party, which may lead to security breaches.
- The character and quality of the work of employees in another company, and may be in another country, cannot be assured.

- Establishing a KPO takes time, and thus, cannot provide immediate solutions to prevailing problems.
- There can be increased complexities, due to lack of communication, between the company and the KPO, possibly because of legal, language, and cultural barriers.
- Inferior quality of outputs, missed delivery times, and cultural differences can take place.
- Increased costs due to salary inflation, increased standard of living, and improved (stronger) currency of some developing countries like India may adversely affect the company.
- Political and economic instability as well as terrorist activities in the countries can affect the company.
- Losing out on key talent at home is a major threat to the company.



KPOs provide high-end services to customers and require skilled personnel. Additionally, the salary of employees working in KPOs is far better than those working in BPOs.

**Reasons for successful KPOs in India** Following are some of the reasons for the success of KPOs in India

- Maturity in handling BPOs
- Availability of high-end skilled labour, including chartered accountants, engineers, doctors, architects, lawyers, economists, biotechnologists, and the like
- Low wages and operational costs as compared to developed nations
- Operational efficiency
- Adherence to international quality standards

These days, however, many companies are moving their voice-based KPOs to countries (such as Chile and Mexico) with higher political stability and similar language, time zone, and cultural alignments. People in these countries have English as their first language and use the same accent as that used in most of the core companies.

**Example 1.2** Delta and United Airlines brought back their outsourced customer service operations to North America, when low rates of satisfaction for more sophisticated conversations with customers were reported. Even the other employees in the core company, who were dealing with outsourced processes, had the same experience.



While basic education is necessary to get a BPO job, for a KPO job, competency in a particular field is a must. A job in a KPO is not suited for a person who is a *Jack of all trades*. In a KPO, employees are rigorously trained in a specific sector.

These days, BPOs are moving towards Philippines and Bangladesh. In such a situation, India is concentrating more on KPOs. US stands strict on outsourcing BPO, but it can never curb outsourcing of activities that require skilled labour, as there is an enormous deficiency of such labour force in the country.

## 1.3 TYPES OF INFORMATION SYSTEMS

Business organizations today leverage available technologies to manage their business, collect data, process data to analyse it to make important decisions, interact with customers and partners, curtail costs, and generate revenues. For performing these operations, business organizations use different types of information systems, wherein an *information system* is a collection of hardware, software, data, people, and procedures that are designed to generate information to support routine activities.

There are different types of Information systems. But before reading about them, let us first understand why we cannot have a single information system deployed in an organization.

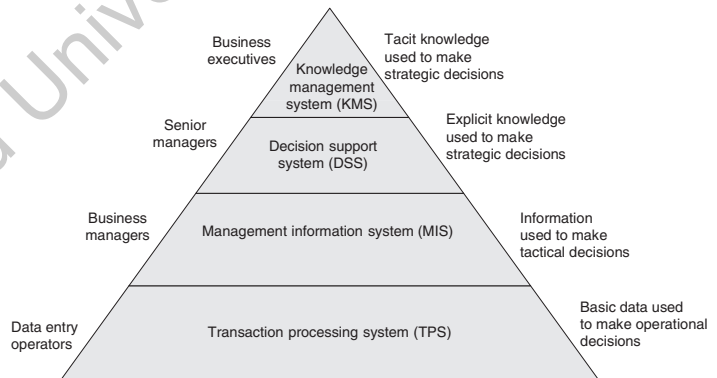
### 1.3.1 Why are There Different Types of Information Systems?

Earlier, when computers were new to the world of business, each time an information system was needed, it was *tailor-made* or customized for the specific purpose. Computer experts soon realized, however, that most of the information systems were designed to solve a similar set of problems. Therefore, attempts were made to build a single system that would solve a whole range of similar problems. While designing information systems for similar problems, it was important to define how, where, why, and by whom the information system would be used. These questions gave rise to different information systems that were designed for different types of users working in the organization.

### 1.3.2 Implementation of IS at Managerial Level (Operational, Tactical, and Strategic)

To identify different types of information systems, classification is done to identify a set of activities that can be categorized together, so that they can be treated as a single unit. Although there is no well-defined rule to classify an information system, it is necessary to classify them in order to ease the design of applications they would render. Figure 1.8 shows the pyramid model used to classify information systems. As most organizations work in a hierarchy, the information systems are also categorized to follow the hierarchy.

Figure 1.8 gives a generalized pyramid model for classifying different types of information systems in an organization. It does not mean, however, that every business organization must strictly adhere to it. While some small businesses can have just three levels, that is, transaction processing system (TPS), management information system (MIS), and decision support system (DSS), large organizations can have two additional information systems, namely office automation/information system (OAS/OIS) and executive information system (EIS). In this section, we will read about all of them.



**Figure 1.8** Pyramid model of information systems



The pyramid model mirrors the nature of tasks found at different levels in the organization.

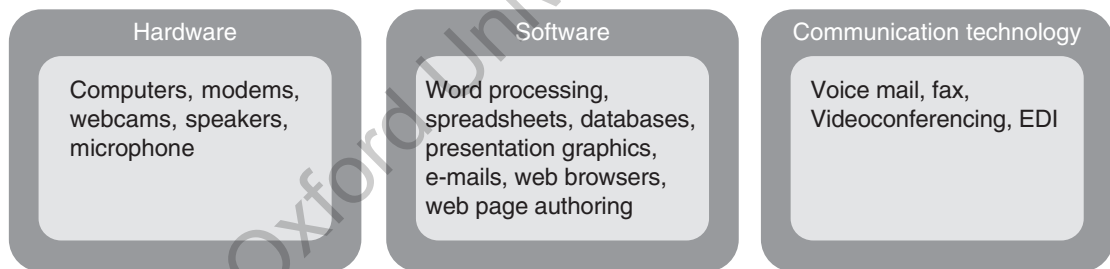


## Office Information System or Office Automation System

Office information system (OIS) or office automation system (OAS) uses hardware, software, and networks to enhance work flow and facilitate communication among employees. While hardware includes computers equipped with modems, video cameras, speakers, microphones, scanners, and fax machines, software comprises word processing, spreadsheets, databases, presentation graphics, email, web browsers, web page authoring, personal information management, and groupware to support the aforementioned activities. Besides hardware and software, an OAS also uses technology for communication, such as voice mail, fax, videoconferencing, and electronic data interchange (EDI) for the electronic exchange of documents, which include text, graphics, audio, and video (refer Figure 1.9).

In such a system, employees perform their tasks electronically rather than manually. For example, in an OAS in your college, the time table, academic calendar, subjects in the semester, along with their guidelines, notification of events in the university, fee structure, and the like, are all published online, either on the website or as notifications, using emails. Had it been a manual system, the office staff would have to take a photocopy of the information and send it to each student's home as a letter or as registered post.

Office automation systems are implemented to support a range of business office activities like creating and distributing graphics and/or documents, sending messages, scheduling, and accounting. Although it is meant to be used by clerks and officers working at the lower level of the pyramid, all levels of users avail some benefit from the OAS.



**Figure 1.9** Components of OAS

## Transaction Processing System

A transaction is a business activity (like deposit, payment, order, or reservation). Correspondingly, TPS is an information system that is specifically designed to capture and process data generated in an organization, during its day-to-day transactions. It is basically used by clerical staff, front-office personnel, and other employees working at the lowest level of the pyramid to perform the following transactions online.

- Record information regarding a student during his registration, an order placed by the customer, payment details of a client, and the like.
- Confirm an action or send a response to inquiries, issue receipts of payments, send a thank-you mail to customers, and so on.
- Collect customers' feedback.
- Generate employees' paycheck.
- Add, update, and delete existing data.

Transaction processing system was one of the first computerized systems developed to process business data (also known as *data processing*). The first TPS was based on batch processing, in which data is collected over a period of time, and all transactions are processed later as a group. But with drastic improvements in computing technology, batch processing systems were upgraded to online transaction processing systems (OLTPs), in which the computer processes transactions as they are entered.

These days, the OLTPs have widely replaced the earlier and now obsolete batch processing systems, and you have already seen OLTPs when registering yourself in college, shopping in a showroom that generates electronic invoices, paying bills in a restaurant that generates a printed receipt, and so on. Other places in which TPS is used includes payroll systems, order processing systems, reservation systems, stock control systems, and systems for payments and funds transfers.

**Advantages** Here are some of the advantages of TPS:

- Enhanced efficiency and accuracy of business activities
- Faster processing
- Reduced clerical costs
- Improved customer service

**Example 1.3** In an online air ticket booking system, travellers select their flight schedules and desired seats, and the system updates the availability of seats. The system also generates a bill and a copy of the ticket as its output.



Data gathered using a TPS can be used by upper level employees to view a detailed report and create an action report.

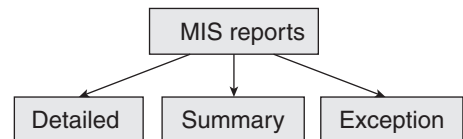
## Management Information System

While TPS is best suited for routine transaction processing, business managers felt the need for an information system that could perform rapid calculations and data comparisons, in order to produce meaningful information for management. This need led to a new type of information system called MIS. It is an information system generating accurate, timely, and organized information that helps business managers make decisions, solve problems, supervise activities, and track progress by generating useful reports on a regular basis. Therefore, it is also known as a *management reporting system (MRS)*.

For better integration with business activities, MIS is integrated with TPS, so that MIS can generate reports using the data collected by TPS. For example, while TPS records the daily sales, updates the customer's account balance, and makes a deduction from inventory, MIS can use this information to produce reports that recap daily sales activities, list customers with past due account balances, identify slow or fast-selling products, and highlight inventory items that need reordering. It generates three types of reports, as shown in Figure 1.10. These are explained as follows.

**Detailed report** This lists transaction processing activities. For example, a detailed order report enlists all transactions that involve ordering of items.

**Summary report** This aggregates data so that managers can get a quick overview of the business activity. It synthesizes large amounts of information that contains totals, tables, or graphs. For example, an inventory summary report summarizes the items and the number of units available.



**Figure 1.10** Types of reports



**Exception report** This filters data to identify information that is beyond a normal condition (also called *exception condition*) and notify business managers, so that corrective measures can be instantly taken. For example, an inventory exception report notifies the purchasing department of items whose stock is less than the specified normal stock. These items must be reordered at the earliest. Exception reports enable managers to save their time, as they no longer have to go through the detailed report to identify exceptional conditions.

Management information system is used by business managers working at the middle level of the pyramid in order to ensure smooth running of the organization in the short- to medium-term. The highly structured information, produced by MIS, enables managers to evaluate their organization's performance, by comparing current output with the previous one.

Management information system supports structured decisions. Besides action and detailed reports, MIS also generates summary reports. Examples of MIS include sales management system, inventory control system, human resource management system, budgeting systems, and the like. The downside of these systems, however, is that they have little analytical capability. It also helps compare past values with the present, but does not facilitate prediction of the future.

## Decision Support System

Transaction processing system and MIS are very well suited for providing information to appropriate users on a regular basis. But senior managers need some other type of information to make some longer term decisions. For short-term decisions, MIS is enough, but for decisions regarding a longer period of time, say a year, an MIS is not the one we should look for. For example, a sales manager needs information to find out how high to set yearly sales quotas, based on increased sales and lowered product costs. A DSS provides information to support such decisions.

In order to make vital decisions, DSS not only uses data from its internal information systems, but also makes use of data from external sources, like business magazines, surveys of competitors available on the Internet, interest rates, population trends, customer demographics, spending behavior of a group of customers, and so on.

Decision support system makes full use of query language (discussed in Chapter 5), statistical analysis tools, spreadsheets, and graphics to analyse data, evaluate results, and identify and document factors affecting a decision. This could not only help the sales manager to estimate the expected sales volume at each price level with greater accuracy, but also enable him to ask what-if questions, by changing one or more of the factors (that could affect the sales) and view the projected results.

**Executive information system** Executive information system is a special type of DSS, which is specifically designed for the information needs of business executives. It makes use of charts and tables to represent information that could help executives view trends, ratios, and other statistics, predict future sales patterns, summarize current costs, and forecast sales revenues.

Executive information system is basically used to make strategic decisions, and therefore, relies heavily on external sources of data like the Dow Jones news and the Internet, to retrieve information on interest rates, commodity prices, and other leading economic indicators. To store all the external as well as internal data, current as well as historical data, DSS and EIS use extremely large databases, called data warehouses (refer to Chapter 5).

Data warehouses, along with EIS, help executives analyse data according to the entire business or at the individual department, region, or a particular store. For example, the executive of McDonald's can view the daily sales, either in all the stores worldwide, or in a particular county, or in a particular city, or at a specific outlet.



Decision support system and executive information system are interactive systems that are used to analyse existing structured information to perform what-if analysis to generate summary reports and business forecasts to identify long-term plans and make strategic decisions.

**Example 1.4** Financial institutions like banks use EIS to develop credit risk models to analyse the number and extent of lending or credit that is given to various sectors. For this, various techniques and formulae are used to determine the probability of loan defaults.

### Knowledge Management System

In Section 1.1, we have already seen the difference between data, information, and knowledge. Knowledge is personalized information, a state of knowing and understanding that is stored and manipulated, to influence actions. Knowledge is obtained through the organization's data warehouse, DSS tools, internal expertise, and networks of knowledge workers.

All the discussed systems fall under KMS. We can also say that KMS extends the already existing systems by assimilating more information. Basically, KMS refers to a system that manages knowledge in an organization (in the form of documents, policies, procedures, expertise, and experience) to support identification, creation, capture, evaluation, storage retrieval, sharing, and dissemination of information, as shown in Figure 1.11. It helps employees have ready access to the organization's documented base of facts, sources of information, and solutions, as shown in Figure 1.11. It also provides network maps of the organization, depicting the flow of communication between entities and individuals.

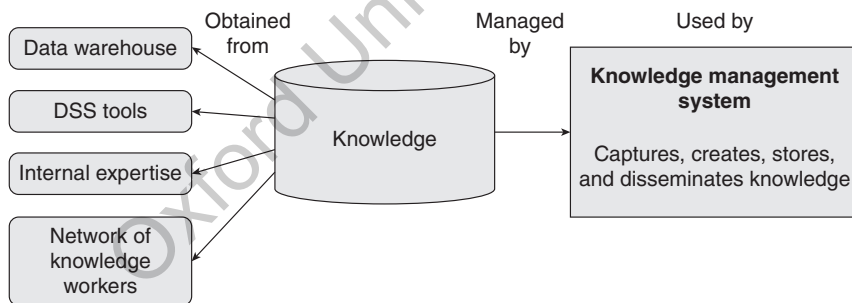


Figure 1.11 Knowledge management system

**Example 1.5** The most effective strategy to promote a product in rural areas can be shared organization-wide, to help the sales and marketing team throughout the country to use the same strategy. It also opens up a new platform to discuss new and improved strategies.

#### Features

- Stores knowledge that is developed collectively.
- Comprises a range of practices to create and enable adoption of knowledge, embodied in an individual or in organizational processes.
- Knowledge exists in the form of documents, policies, procedures, expertise, and experience.
- Distribution of knowledge through KMS results in continuous change, reconstruction, and application of knowledge in different contexts.
- Required information is effectively and efficiently retrieved, whenever required.

**Types of knowledge managed** An effective KMS provides a variety of information, which includes the following.

**Experiences** It collects information retrieved from people, who have already tackled a problem and found a solution. Therefore, KMS stores information about successful strategies, and also the best practices to solve a particular problem.

**Expertise location** It stores a network map that informs the users about where to locate for an expert or expert information.

**Communities of practice** It enables groups of individuals to discuss their problems, opportunities, lessons learned, and other information gained from users.

**Feedback** An organization can collect feedback from customers and employees and share it with their research and development (R&D) departments, so that an integrated approach can be taken to understand the shared information and produce better products and services. For example, a company developing a new product may conduct research on their competitors and ask the R&D team to identify the ingredient needed in their product. The R&D team can find out from the KMS team the assets and processes the company has in place, which can be used to meet the sales potential, meet customer needs, and fill gaps within the marketplace.

**Share project files** An employee team can work collaboratively on a project. They can share their files and information to allow everyone in the team to upload and comment on the work performed by others.



Knowledge management system is widely implemented in firms of lawyers and for those working with accounting and management consultancy.

**Advantages** Knowledge management system can be associated with open source software, and open standards, open protocols and open knowledge licenses, and initiatives and policies. Its advantages include the following:

- Improved performance
- Competitive advantage
- Innovation, which gives a cutting edge to perform better than one's competitors
- Integrating and sharing of knowledge
- Solving problems faster
- Developing professional skills
- Orientation and training of new employees
- Support of better sales, by helping business users make critical decisions in a better and informed manner
- Creation of knowledge directories
- Avoidance of re-inventing the wheel, thereby reducing redundant work
- Retention of intellectual property, even after the employee leaves the organization
- Service as central repository, to retain information in a standard format
- Ensuring of consistent and speedy responses to user queries

Many large organizations are reaping the benefits of KMS. These days, even small businesses are implementing it.

## Summary

- Information must be relevant, accurate, complete, current, and economical.
- These days, almost every business is conducted over computers and communication devices to organize large databases, personal schedules, and various other forms of essential information.
- Breakthrough in information technology (IT) has resulted in better or automated solutions that have not only increased the productivity, but also involve lower operational costs, improved speed, ease of sharing and storing information, decrease in human error through automation, and an increase in revenue.
- All businesses today are moving towards marking their presence on the Internet. Whether big or small, all business have a website to advertise their products, take orders, buy merchandise, and sell excess products.
- Outsourcing is done as a cost-saving measure by big companies that want to focus on their key business area, rather than focusing on routine business tasks.
- An office information system (OIS) or office automation system (OAS) uses hardware, software, and networks to enhance work flow and facilitate communication among employees.
- MIS is an information system that generates accurate, timely, and organized information. This helps business managers make decisions, solve problems, supervise activities, and track progress, by generating useful reports on a regular basis.
- Decision support system (DSS) not only uses data from its internal information systems, but also makes use of data from external sources such as business magazines, surveys of competitors available on the Internet, interest rates, population trends, customer demographics, and spending behaviour of a group of customers.
- Knowledge exists in the form of documents, policies, procedures, expertise, and experience.

## Glossary

**Artificial intelligence (AI)** A branch of computer science that works on making computers intelligent like humans

**Back-office outsourcing** Outsourcing of internal business functions such as payroll, billing, purchasing, accounting, and HR

**Business data processing (BDP)** Performing operations to convert business data into useful information

**Data** A collection of raw facts or figures

**Expert system** A branch of AI that designs intelligent machines, which solve real-world problems by using deductive logic

**Front-office outsourcing** Outsourcing of customer-related services such as marketing and technical support

**Information** Processed data to provide answers to *who, what, where, and when* type of questions

**Information system** A collection of hardware, software, data, people, and procedures that are designed to generate information to support routine activities

**Information technology (IT)** A comprehensive term that includes all types of technology used to exchange, store, use, or create information

**Knowledge** Application of data and information to answer the *how* part of the question

**Knowledge management system (KMS)** A system that manages knowledge in an organization (in the form of documents, policies, procedures, expertise, and experience) to support identification, creation, capture, evaluation, storage retrieval, sharing, and dissemination of information

**Mobile application (app)** Software application that runs on smartphones, tablets, and other mobile devices

**Natural language processing (NLP)** A branch of AI that involves programming computers to understand natural human languages

**Nearshore outsourcing** Outsourcing to a neighboring country

**Offshore outsourcing** Outsourcing to another country

**Onshore outsourcing** Outsourcing in the same country

**Outsourcing** Hiring employees who work outside the company

**Robotics** A branch of AI that programs computers to see, hear, and react to sensory input

## Multiple-choice Questions

- Collection of raw facts or figures is called \_\_\_\_\_.  
(a) data (c) knowledge  
(b) information
- Processed data is known as \_\_\_\_\_.  
(a) input (c) knowledge  
(b) information (d) output
- The 'how' part of a question is answered by \_\_\_\_\_.  
(a) data (c) knowledge  
(b) information
- Information should be \_\_\_\_\_.  
(a) economical (c) both of these  
(b) relevant (d) only (b)
- If the employee works hard and is skilled with the latest technology, then his promotion is guaranteed. Which of the following best describes this statement?  
(a) data (c) knowledge  
(b) information
- Monthly salary of a parliament member is an example of \_\_\_\_\_.  
(a) data (c) knowledge  
(b) information
- \_\_\_\_\_ means performing operations in order to convert business data into useful information.  
(a) Business data processing  
(b) Built-in data process  
(c) Business digital processing
- \_\_\_\_\_ software is widely used by businesses to analyse and summarize data and draw charts.  
(a) Word processing (c) Database  
(b) Spreadsheet (d) Presentation
- BDP cannot be used for \_\_\_\_\_.  
(a) accounting  
(b) payroll  
(c) inventory management  
(d) none of these
- Microsoft Money and QuickBooks are examples of \_\_\_\_\_ software.  
(a) accounting and payroll  
(b) only payroll  
(c) inventory management  
(d) only accounting
- Inventory management can be done on \_\_\_\_\_ software.  
(a) Microsoft Word (c) Open Office Calc  
(b) Microsoft Excel (d) (b) and (c)
- QuickBooks is a software used for \_\_\_\_\_.  
(a) accounting (c) book keeping  
(b) payroll (d) all of these
- Flipkart, Snapdeal, Amazon are \_\_\_\_\_ websites.  
(a) online shopping (c) email  
(b) social networking (d) search engine
- Online marketing is done through \_\_\_\_\_.  
(a) email (c) both (a) and (b)  
(b) Google AdWords (d) none of these
- \_\_\_\_\_ was the bank which first started mobile face-to-face banking.  
(a) ICICI (c) Indus Ind  
(b) HDFC (d) SBI
- CRM stands for \_\_\_\_\_.  
(a) call record management  
(b) customer record management  
(c) customer relationship management  
(d) all of these

17. Web cameras and microphones are together used in \_\_\_\_\_.  
 (a) tele conferencing  
 (b) tele commuting  
 (c) video conferencing
18. Outsourcing is mainly done to \_\_\_\_\_.  
 (a) reduce costs  
 (b) save time  
 (c) increase productivity  
 (d) automation
19. Payroll processing, if outsourced, will be a part of \_\_\_\_\_.  
 (a) BPO  
 (b) KPO  
 (c) PPO  
 (d) LPO
20. BPO service that is outsourced within the same country is called \_\_\_\_\_.  
 (a) outsourcing  
 (b) on sourcing  
 (c) nearshore outsourcing  
 (d) onshore outsourcing
21. In which type of outsourcing payroll, are billing and HR outsourced?  
 (a) Internal outsourcing  
 (b) External outsourcing  
 (c) Front-office outsourcing  
 (d) Back-office outsourcing
22. In which type of outsourcing is customer service outsourced?  
 (a) Internal outsourcing  
 (b) External outsourcing  
 (c) Front-office outsourcing  
 (d) Back-office outsourcing
23. Which of these is not a valid reason for outsourcing?  
 (a) Reduce costs  
 (b) Efficiency of tasks  
 (c) Both of these  
 (d) None of these
24. Equity research is done in \_\_\_\_\_.  
 (a) BPO  
 (b) BDP  
 (c) KPO  
 (d) PPO
25. Identify the disadvantages of KPOs and BPOs.  
 (a) Inferior quality of output  
 (b) Increased complexities  
 (c) Both (a) and (b)  
 (d) None of these
26. Select the most preferred countries for voice-based KPOs.  
 (a) India  
 (b) Chile  
 (c) Mexico  
 (d) All of these
27. Select the most preferred countries (after India) for BPOs.  
 (a) Sri Lanka  
 (b) Bangladesh  
 (c) Philippines  
 (d) All of these
28. Information systems include \_\_\_\_\_.  
 (a) information and software  
 (b) hardware and data  
 (c) people  
 (d) all of these
29. Which type of information system will small organizations usually not have?  
 (a) TPS  
 (b) MIS  
 (c) OAS  
 (d) DSS
30. At which level of information system do senior managers work?  
 (a) EIS  
 (b) DSS  
 (c) TPS  
 (d) KMS
31. At which level of information system are operational decisions taken?  
 (a) EIS  
 (b) DSS  
 (c) TPS  
 (d) KMS
32. Which of the following is not a part of OAS?  
 (a) EDI  
 (b) Voice email  
 (c) Hardware  
 (d) Office building
33. Electronic data interchange is a type of \_\_\_\_\_.  
 (a) hardware  
 (b) software  
 (c) technology  
 (d) none of these
34. At which level of information system is collecting customers' feedback done?  
 (a) EIS  
 (b) DSS  
 (c) TPS  
 (d) KMS
35. At which level of information system are different types of reports generated?  
 (a) MIS  
 (b) DSS  
 (c) TPS  
 (d) KMS
36. In which type of report is aggregated data displayed?  
 (a) Detailed  
 (b) Summary  
 (c) Exception  
 (d) None of these

- (b) Summarized (d) All of these
37. In which type of report is filtered data used to take corrective measures available?  
 (a) Detailed (c) Exception  
 (b) Summarized (d) All of these
38. Which type of system has the least analytical capability?  
 (a) MIS (c) EIS  
 (b) DSS (d) KMS
39. At which level of IS is data from internal sources as well as external sources analysed?  
 (a) MIS (c) OIS  
 (b) DSS (d) TPS
40. At which level of information system is what-if analysis done?  
 (a) MIS (c) EIS  
 (b) DSS (d) Both (b) and (c)
41. Experience, feedback, sharing of project files are features of which type of information system?  
 (a) MIS (c) OIS  
 (b) DSS (d) KMS
42. Open source software can be associated with which type of information system?  
 (a) MIS (c) OIS  
 (b) DSS (d) KMS

### Answers to Multiple-choice Questions

1. (a) 2. (b) 3. (c) 4. (c) 5. (c) 6. (a) 7. (a) 8. (b) 9. (d) 10. (a)  
 11. (d) 12. (d) 13. (a) 14. (c) 15. (c) 16. (c) 17. (c) 18. (a) 19. (a) 20. (d)  
 21. (d) 22. (c) 23. (d) 24. (c) 25. (c) 26. (d) 27. (d) 28. (d) 29. (c) 30. (b)  
 31. (c) 32. (d) 33. (c) 34. (c) 35. (a) 36. (b) 37. (c) 38. (a) 39. (b) 40. (d)  
 41. (d) 42. (d)