



# University of Rajasthan Jaipur

## SYLLABUS

**Post Graduate Diploma in Computer  
Application (PGDCA)**

**2022 – 2023 (I & II Semester)**

*Rg/Tain*  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

# UNIVERSITY OF RAJASTHAN, JAIPUR

## PG DCA

### PG DCA I/II Semesters 2022-23 Onwards

#### Eligibility :

All the graduate(with 10+\_2+3) from recognized university situated in Rajasthan having 48% marks/ CGPA of 3.0 in the UGC Seven Scale for general category & for SC/ST/Non-Creamy Layer OBC/MBC candidates having only pass marks and minimum 60% marks for non-Rajasthan candidate. Reservation as per the University Rules.

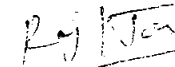
#### Scheme of Examination of PG DCA for the Academic Session 2022-23 and onwards for Affiliated Colleges

1. Each of the semester I and II will consist of six theory papers and three practical papers(Laboratories).
2. Each theory paper shall carry 100 marks for the University semester examination of three hours duration.
3. The University Examination of the theory paper will consist of six questions on the pattern mentioned below :-
  - a. Candidate has to attempt six questions in all.
  - b. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
  - c. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.
4. Each practical paper shall be of 3 hours duration on one day and carry 100 marks for the practical examination. The practical examination will involve 3 exercises, each of 20 marks, practical record of 15 marks and viva-voce examination of 25 marks.
5. The medium of instruction and examination shall be English only.
6. (a) The minimum marks for passing each theory and practical examination shall be 40% separately in the University semester end examination.  
(b) The candidate may be promoted to the II semester if he/she has cleared at least four theory papers and two practical papers of the Semester-I.
7. At the end of the final examination, the candidate eligible for the award of PG DCA degree shall be classified on the basis of marks obtained in semesters I and II examination taken together as follows:

- (a) I division with Honour - 75% or more marks in aggregate provided the candidate has passed all papers and examinations in first attempt.
- (b) I Division - 60% or more marks but fails to satisfy the criterion for being classified distinction as lay in the 7( a).
- (c) II Division - All other than those included in 7(a) and 7(b) above, and marks 48% or more but less than 60% of the aggregate marks.
- (d) All the rest will be declared to have passed the examination, if they obtain a minimum pass marks in each paper, ver., 40%.
8. A candidate must pass the PG DCA Course within Three years of the initial admission to the course.
9. For the award of prizes or ranking, the marks obtained in the first attempt of the examination only will be taken into account.

### PGDCA-First Semester 2022-23 Onwards

S. No.	Subject Code	Subject Title	Course category	Credit	Contact Hours per Week			EoSE Duration(Hr)	
					L	T	P	Thy	P
1	PGD 101	Computer Fundamentals	CCC	4	3	1	0	3	0
2	PGD 102	Operating System	CCC	4	3	1	0	3	0
3	PGD 103	Programming in C	CCC	4	3	1	0	3	0
4	PGD 104	Office Management Tools	CCC	4	3	1	0	3	0
5	PGD 105	E-Commerce	CCC	4	3	1	0	3	0
6	PGD 106	Database Management Systems	CCC	4	3	1	0	3	0
<b>Practical</b>									
1	PGD 111	Programming in C	CCC	4	0	0	6	0	3
2	PGD 112	Office Management Lab	CCC	4	0	0	6	0	3
3	PGD 113	DBMS Lab	CCC	4	0	0	6	0	3

  
 Dy. Registrar (Acad.)  
 University of Rajasthan  
 Jaipur

## PGDCA-Second Semester 2022-23 Onwards

S. No	Subject Code	Subject Title	Course category	Credit	Contact Hours per Week			EoSE Duration(Hr)	
					L	T	P	Thy	P
1	PGD 201	Java Programming	CCC	4	3	1	0	3	0
2	PGD 202	Web Application Development	CCC	4	3	1	0	3	0
3	PGD 203	Software Engineering	CCC	4	3	1	0	3	0
4	PGD 204	Data Communication & Computer Networks	CCC	4	3	1	0	3	0
5		Elective -I	ECC	4	3	1	0	3	0
6		Elective -II	ECC	4	3	1	0	3	0
<b>Practical</b>									
1	PGD 211	Java Lab	CCC	4	0	0	6	0	3
2	PGD 212	Web Development Lab	CCC	4	0	0	6	0	3
3		Elective -III Lab	ECC	4	0	0	6	0	3

### Elective -I (any One)


1. PGD A01 : Data Structures and Algorithms
2. PGD A02 :Cloud Computing
3. PGD A03 :Computer Architecture

### Elective -II (Any One)

1. PGD B01 : Python Programming
2. PGD B02 :PHP Programming
3. PGD B03 :Digital Marketing

### Elective - III Lab (ANY One)

1. PGD B01 :Python Lab
2. PGD B02 :PHP Lab
3. PGD B03 :Digital Marketing Lab

  
 Dy. Registrar (Acad.)  
 University of Jodhpur  
 JAIPUR

## PG DCA First Semester 2022-23

### PGD 101: Computer Fundamentals

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit- I

**Building block of computer system** : Basic building blocks- I/O, Memory, ALU and its components, Control unit and its functions, Instruction-word, Instruction and execution cycle, branch, skip, jump and shift instruction, Operation of control registers, Controlling of arithmetic operations, Classification of computers( Workstation, Mainframe, Super computer, Client-Server computer, Notebook, Tablet, Palmtop computer).

#### Unit II

Computer and its generations, Programming languages generations- Machine, Assembly, High level and OOPs. Language translators. Overview of the Digital Computers –Digital, Analog, Hybrid computers, Digital versus Analog computers, Computer Software – System software and Application Software. Types computer Codes (BCD, ASCII, EBCDIC, Unicode).

#### Unit-III

**Representation of Data:**, Digital number system (binary, octal, decimal and hexadecimal numbers.), Conversion from one form to another, fractional numbers and signed numbers. Complements, Arithmetic operations on binary numbers, Fixed point and floating point representations., Logic Gates (NOT, OR, AND), Encoding and decoding.

#### Unit-IV

**Computer Components** (Briefly overview) : Mother Board, Processor, types of RAM, RAM, Flash, Cache,; SDRAM, DDR), System clock, Buses (Data, Address, Control).

Input devices & output Devices –Printers, Scanner, different types of scanner

Storage devices : Storage types , random versus sequential access, formatting, tracks and sectors, speed, storage capacity, Hard Disk structure; Hard Drive Interfaces (IDE, EIDE, SCSI, RAID,SATA,ATA). Optical Disks : pits and lands, CD (ROM,R,R/W), DVD (ROM,R,RAM). Magnetic tapes, Modem (Fax/Data/Voice).

#### Unit- V

Internet Applications: Internet, Internet Applications, e-Mail, IRC, Web Surfing, Web Browsers.. Search Engines, Internet Service Providers, Downloading, Audio and Video Conferencing.

Security issues in Internet — Bugs, Viruses, Anti-viruses, Firewalls etc. Internet threats to the society, Cyber laws and Legal issues.

*Pg. Jais*  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

**Suggested Reference Books:**

1. M. Morris Mano: Computer System Architecture, 3 Hall of India.
2. John D. Carpinell: Computer Systems Organization & Architecture, 3 edition; Pearson Education Asia.
3. Peter Norton's Introduction to Computers, Third Edition, McGraw Hill
4. Sinha PK; Computer Fundamentals;BPB.
5. Malvino B.; Digital Computer Electronics; III Edn;TM}I.
6. Albert Paul Malvino, Electronic Principles, McGraw Hill
7. P.Pal Chaudhuri, Computer Organization and Design, Prentice Hall of India.

**PGD 102 : Operating System**

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

**Unit-I**

Needs of an Operating System, Operating system structure, Evolution of Operating System ( multiprogramming systems, batch systems, timesharing system, distributed systems and Real Time system), Operating system structure, Operating system components and services, system calls, system programs, Virtual machines.

**Unit-II**

Process management: process concept, process scheduling, cooperating processes. Threads. Inter-process communication, CPU scheduling criteria, Scheduling algorithms. Multiple-processor scheduling, Real time scheduling and Algorithm evaluation.

**Unit-III**

Process Synchronization and Deadlocks: The Critical section problem, synchronization hardware semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

**UNIT –IV**

Storage management: Memory management- Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, page replacement algorithms, Allocation of frames, Threshing, Page Size and other considerations, Demand segmentation

6

*Aj/Tan*  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

## Unit-V

File & Disk Management :File systems, secondary storage Structure, File concept access methods, directory implementation, Efficiency and performance recovery, Disk structure. Disk scheduling methods, Disk management , Recovery Disk structure, disk structure, disk scheduling methods, disk management, Swap-Space management, Disk reliability.

### Recommended books:

1. Galvin P.B, Silberschatz; Operating System Principles; ( Seventh Edition),J Wiley.
2. Tanenbaum A.S, Modern Operating Systems, 2<sup>nd</sup> Edn. PHI Publ.
3. William Stalling: Operating Systems, Internal & Design Principles, Sixth Edn; Pearson.
4. Gary Nutt: Operating Systems-A Modern Perspective (Second Edition) , Pearson Education.
5. D.M. Dhamdhare: Systems Programming and Operating Systems ( Second Edition), Tata McGraw Hill Publishing company Limited.
6. Harvey M. Deitel, Operating Systems, Pearson Education.

## PGD 103 : Programming in C

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

## Unit-I

Problem solving with computers, Flow charts, Basic concepts of programming languages, programming domains.

C Character set, variables and constants, keywords, Type checking, Scope and lifetime data types. Operators, Instructions, assignment statements, arithmetic expression, comment statements, simple input and output, Boolean expressions.

## Unit-II

Control structures, decision control structure, loop control structure, case control structure. String and character handling, arrays and string processing, data validation examples .

Functions, function prototype, subroutines, scope and lifetime of identifiers parameter passing mechanism, recursion.

## Unit-III

User defined data types, enumerated data types, unions, structures, array of structures,

Unions of structures. Storage class specifies, Pre processors header files and standard lib, Functions.

## Unit IV

Pointer : Definition and uses of pointers, arithmetic , pointers and arrays, pointers and function, pointer to pointer, pointer to structures. Dynamic memory allocation.

## Unit-V

**Implementation of simple data structures** : Stacks, Queues, Linked Lists, Binary search tree, searching and sorting algorithms.

Console Input and Output functions, data files, operations on data files, text and binary files, formatted data files.

### Recommended reference books:

1. Gottfried B; Programming with C: Schaum Qutlines; Mc Graw Hill Edition.
2. Balagurusamy E; Programming in ANSI C;Fifth Edn; Mc Graw Hill,2011.
3. Kanetkar Y.; LET US C; X Edition, BPB,2010
4. Deitel HM & Deitel JP; C How to program; 5<sup>th</sup> Edn; Pearson Pub.

## PGD 104: Office Management Tools

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

## UNIT-I

The Need and Importance of Office Automation, Role of computer in Office automation and management, Office automation software. Office system user interface, Managing security and privacy in MS Office system, Sharing documents between Office System Components, Different versions of office system, Office management using smart devices.

## UNIT- II

**MS Word:** Word processing, MS-Word features, creating saving and opening documents in Word, interface, toolbars, ruler, menus, keyboard shortcut, editing, previewing, printing & formatting a document, advance features of MS Word, find & replace, using thesaurus, mail merge, handling graphics, tables, converting a Word document into various formats like-text, rich text format, Word perfect, etc.

*Raj Jain*  
Dy. Registrar (Acad.)  
University of Rajasthan  
JALPUR



### UNIT- III

**MS Excel:** Worksheet basics, creating worksheet, entering data into worksheet, data, text, dates, alphanumeric values saving & quitting worksheet, opening and moving around in an existing worksheet, Toolbars and menus, Keyboard shortcuts, working with single and multiple workbook, working with formula & cell referencing, Auto sum, coping formulas, absolute and relative addressing, formatting of worksheet, previewing & printing worksheet, Graphs and Charts, Database, macros, multiple worksheets-concepts.

### UNIT- IV

**Power Point:** Creating and viewing a presentation, managing Slide Shows, navigating through a presentation, using hyperlinks, advanced navigation with action setting and action buttons, organizing formats with Master Slides, applying and modifying designs, adding graphics, multimedia and special effects.

### UNIT- V

**Microsoft Access:** Planning a database (tables, queries, forms, reports), creating and editing database, customizing tables, linking tables, designing and using forms, modifying database structure, Sorting and Indexing database, querying a database and generating reports.

#### Reference Books:

1. Microsoft; 2007/2010 Microsoft Office System; PHI.
2. Microsoft; Microsoft Office 2007/2010: Plain & Simple; PHI.
3. Sanjay Saxena; A First Course in Computers 2003 Edition; Vikas Pub.
4. Computer Fundamentals by P.K. Sinha, BPB Publication.
5. Computer Fundamentals and Programming in C, Reema Thareja, OXFORD University Press.
6. Introduction to Computer, Peter Norton's, Tata McGraw Hill Publication.
7. MS-Office, Dr. S.S. Shrivastava, Published by Laxmi Publication.
8. Office 2019: In Easy Steps, Michal Price, BPB Publication.

### PGD 105: E-Commerce

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### Unit-I

Basic Concepts : Introduction, Definition, Objectives, Advantages and disadvantages, Traditional commerce Vs E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce.

*R. J. Jais*  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

Electronic Data Interchange : Concepts of EDI and Limitation, Application of EDI. Disadvantages of EDT, EDI model; MIME and Value-Added Network, Internet-based EDT.

### Unit-II

E-Commerce Models: B2C, B2B, C2C, C2B, other models — Brokerage Model, Aggregator Model, Info-mediatory Model, Community Model and value chain Model.

Electronic Payment Systems: Special features required in payment systems, Types of E-payment systems, E-Cash, E-cheque, credit card, Smart Card, Electronic Purses, e-Billing.

### Unit-III

E-Transition Challenges in Indian Corporate, E-Commerce and WWW, e- Marketing, E-Customer Relationship Management, E-CRM Problems and Solutions, CRM Capabilities and Customer life cycle, E-Supply Chain Management.

E-Strategy Planning the E-Commerce Project, E-Business Strategy and Data Warehousing & Mining. Customer-effective Web Design.

### Unit- IV

M-Commerce: Overview of mobile-Commerce, Mobile Delivery Technology & Switching Methods, m-Commerce Security issues, Mobile ATM(ICICI Bank Case Study). Applications of M-Commerce: Mobile Financial Applications, m-wallet, Mobile Shopping. Case-Study of an e-commerce application.

### Unit- V

Security Issues in E-Commerce: Network and Website Security Risks, Security risk of E-Commerce, Types of threats, Security tools and risk management approach. Cyber laws, Business Ethics, Social Ethics, IT Acts of the India.

### Suggested Books:

- (1) Bharat Bhaskar, Electronic Commerce — Framework Technologies and Applications, Tata McGraw Hill.
- (2) Ravi Kalakota & A.B. Whinston, Frontiers of Electronic Commerce, Pearson Education.
- (3) Ravi Kalakota & A.B. Whinston, Electronic Commerce — A Manager's Guide, Pearson Education.
- (4) Agarwala Kamlesh, N and Agarwala Deeksha, Business on the Net Introduction to the E-Com., Macmillan India.
- (5) P. T. Joseph, E-Commerce: A Managerial Perspective, PHI.

### PGD 106: Database Management Systems

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.

3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

Overview of DBMS: Basic concepts, Database system architecture, Schemas, Instances. Components, Database users, Three-tier architecture, Centralized, Distributed and Client/Server architecture, Data independence. Database models: Entity relationship model, hierarchical model, relational model, network model, Object-Oriented data model.

### Unit II

Data Modeling using ER Model: ER model concepts, ER diagram, mapping constraints, Keys. Generalization, aggregation, reduction of ER diagrams to tables, extended ER model. Relationship of higher degree. Enhanced ER Model : Concepts, Specialization, Generalization. Data abstraction, Knowledge representation and University EER Model as example.

### Unit-III

Relational Model : Concepts, Constraints, Languages, Relational database design by ER & EER mapping, Relational algebra relational calculus.  
Normalization : Normal forms – First, second, third and BCNF.

### Unit-IV


Transaction processing : Transactions atomicity, durability, serializability and isolation. Concurrency control techniques – Two phase locking, timestamp ordering, multiversion. Granularity locking techniques, Database recovery techniques based on deferred & immediate updates and shadow paging.

### Unit-V

SQL: Characteristics of SQL, advantages, data types in SQL, SQL Operators, types of SQL commands, Tables indexes, Views Nulls, Aggregate Functions, Select statement, Sub queries. Insert, Update and Delete operations, Joins, Unions. .

### Reference Books:

1. Korth H F and Silberschataz A, System Concepts, Sixth Edition; McGraw Hill.
2. Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
3. Ivan Bayross; SQL/PL 4<sup>th</sup> Edn: BPB,2018.
4. Navathe S.B. Elmasri R,; Fundamentals of Database Systems, Fifth Edition, Pearson.
5. Ramakrishan and Gharke, Database Management Systems, 3<sup>rd</sup> Edition, Tata Mc Graw Hill.
6. Data C J Database Management Systems, Pearson Education Asia.
7. Singh S.K.; Database Systems; I Edition; Pearson.

  
By, Registrar (Acad.)  
University of Rajasthan  
JAIPUR

## Practicals

Each practical paper shall be of 3 hours duration on one day and carry 100 marks for the practical examination. The practical examination will involve 3 exercises, each of 20 marks, practical record of 15 marks and viva-voce examination of 25 marks.

### **PGD 111: Programming in C**

Lab Exercise on Theory Paper PGD 103

### **PGD 112: Office Management Lab**

Lab Exercise on Theory Paper PGD 104

### **PGD 113: DBMS Lab**

Lab Exercise on Theory Paper PGD 106

*Rg/Tan*  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

## PG DCA Second Semester 2022-23

### PGD 201: Java Programming

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### UNIT – I

**Introduction to OOP** : Basic concepts of Object Oriented Programming . Objects and Classes. Data abstraction and Encapsulation, Inheritance, Polymorphism. Dynamic binding. Message communication: Benefits & applications of OOP.

**Introduction to Java** : History, Java features, java Environment-JDK, API. JVM, Byte code interpretation, Types of Java programs, Data types, type casting, operators (Arithmetic, increment, decrement, relational, logical, bit wise, conditional) and expressions.

#### UNIT – II

**Decision Making and Branching** : Decision making and branching (if...else, else if. switch). looping, wrapper classes, Vectors, Arrays, Types of arrays, String Methods, String Buffer Class.

**Class and Objects** : Defining a class, Methods, Creating Objects, Accessing class members. constructors, overriding methods, Static members, nesting of methods, this keyword.

#### UNIT – III

**Inheritance** : Define a subclass, deriving a sub class, Types and applications, Overriding methods, Final variables and methods, final classes, Finalize methods, Abstract methods and classes, Visibility Control- Public access, Private access, protected and default access, Defining interface, Extending interface, Implementing Interface, Accessing interface variables.

**Multithreading**: Creating threads, life of a thread, defining & running thread, thread methods. thread priority, synchronization, implementing run-able interface, thread scheduling.

#### UNIT – IV

13

Rg / Jan  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

**Packages:** Java API Packages-System Packages, Naming Conventions, Creating & Accessing a Packages, Finding Packages and CLASSPATH, Adding Class to a Packages, Hiding Classes.

JAVA Streams : Data Flow with Java Streams, Input Streams, Output Streams.

**Exception Handling :** Exception-Handling fundamentals, Exception types, try, catch, throw, finally, creating exception sub classes.

## UNIT – V

**AWT controls** (Button, Labels, Combo box, list and other Listeners), Layout and component managers, Event handling, string handling (only main functions), graphic programming (line, rectangles, circle, and ellipses).

**Networking:** Java utility for networking, Manipulating URLs, reading a file on a Web server. Establishing simple Client Server. Introduction to Java Beans SDK, JAR files, Servlets Life cycle of servlet, JDBC connectivity.

### Recommended Text Books

1. Mastering java 2, BPB Publications. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. Java Programming John P. Flynt Thomson 2nd
3. The complete reference JAVA2, Herbert schildt. TMH
4. Arnold,Gosling, “ The Java Programming Professional 2000”, Addison Wesley Publication
5. C.Thomas wu, ”An introduction to oop with Java”, TMH

## PGD 202: Web Application Development

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

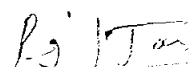
Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### Unit-I

**Introduction to Web Technologies:** Creating and Maintaining Web Sites; Planning, Navigation and Themes, Site types and Architecture, Elements of a Web page, publishing and publicizing site/structuring web site. Search Engine Optimization,, Site Maps and other Navigation Aid. Site Delivery and Management, Web Standards & W3C recommendations.

94

  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

## Unit-II

**HTML Fundamentals:** Introduction to HTML, Creating HTML Pages, incorporating Horizontal Rules and Graphical Elements, Hyper-links, Creating HTML Tables, Creating HTML Forms. HTML and Image Techniques, HTML and Page, Frames, Development of Website and Webpage (Planning, Navigation and Themes, Elements of a Web page, steps of creating a site, publishing and publicizing site structuring web site.

## Unit-III

**Cascading Style Sheets:** Understanding Style Sheets, CSS Syntax and Applying Style Sheets to HTML document, Developing Style Sheets: inline, internal and external. <DIV> tag, Using class and ID, Styling Backgrounds, Styling borders, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables, Margin.

## Unit-IV

**Java script:** Introduction to scripting language, memory concepts, arithmetic decision making. Java script control structures, Java script functions, events, program modules in java script. function definitions duration of identifiers, scope rules, Controlling Programming Flow. recursion java script global functions.

## UNIT V

**Java script & arrays:** introduction, array declaring and allocating memory, passing arrays to functions, multiple subscripted arrays. The Java Script Object Model Java Script language Objects, Developing Interactive Forms, Cookies and Java Script Security Controlling Frames in Java Script, Client – Side Java Script Custom, JavaScript Objects

### Recommended Books:

1. M.L. Young; Complete Reference b: Internet; 2<sup>nd</sup> Edition; Tata McGraw Hill.
2. Thomas A; Powel: Web Design ; C.R. : Second Edition TMH..
3. Thomas A. Powel : HTML & XHTML : C.R. Fourth Edition; TMH.
4. Mastering HTML 4.0 by Deborah S.Ray an Eric J. Ray From BPB
5. G. Roverston; Hands on HTML., BPB Publication
6. D.A. Tauber, B. Kienan; Microsoft From Page 2000, BPB Publications.
7. Joel Sklar: Principles of Web Design BPB Publication

## PGD 203: Software Engineering

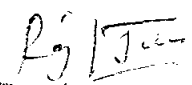
Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

95

  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

## Unit-I

**Software Engineering Fundamentals:** Software, Problem Domain, Software Engineering Challenges. Software Processes (processes, projects & products, component).

**Software Development Process Models:** Waterfall Model, Prototyping, Iterative Enhancement Model, Spiral Model. Introduction to Agile Model: Principles, Steps, Various Agile Process Models.

**Software Requirement Analysis & Specification:** Need, Characteristics & Components. Introduction to Requirements Modeling: Data Flow Diagram and Use Cases.

## Unit-II

**Introduction to Metrics:** Function Point, Line of Code (LOC) and KLOC.

**Software Project Planning:** Cost Estimation- Uncertainties in Cost Estimation, Building Cost Estimation Models, On Size Estimation, COCOMO Model.

**Project Scheduling:** Average Duration Estimation, Project Scheduling & Milestones. Quality Assurance Plans: Verification & Validation, Inspection & Reviews.

## Unit-III

**Design Engineering:** Design Process & Design Quality, Design Concepts (abstraction, architecture, patterns, modularity, information hiding, functional independence, refinement, refactoring, and design classes), The Design Model (data design elements, architectural design elements, interface design elements, component-level design elements, deployment-level design elements).

## Unit-IV

**Testing Strategies & Tactics:** A strategic approach to software testing, Strategic issues. Software testing fundamentals, Test characteristics, Test Strategies for conventional software: Unit Testing, Integration testing, Validation Testing, System testing, Black-Box testing, White Box testing.

## Unit-V

**Risk Management:** Overview, Assessment, Control.

**Software Reliability:** Measures of Reliability & Availability, Software Safety.

**Maintenance and Reengineering:** Introduction to: Software Maintenance, Software Supportability, Reengineering, Reverse Engineering, Restructuring, and Forward Engineering.

## Reference /Text Books

1. Pressman, Roger (2001) Software Engineering; A Practitioner's Approach, 8th ed. M Graw-Hill, 2014.
2. Sommerville Ian; Software Engineering, 9th Ed. Pearson Education, 2014
3. Jalote, Pankaj (7) An integrated Approach to Software Engineering 2nd Ed.
4. James Rumbaugh. Micheal Blaha, "Object oriented Modeling and Design with UML", 2nd Edition, 2007.
5. Simon Bennett, Steve McRobb and Ray Farmer, " Object-Oriented Systems Analysis and Design Using UML" 4th Edition, McGraw Hill Education, 2010

96

Raj Jais  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR



## PGD 204: Data Communication and Computer Networks

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### UNIT-I

**Data Communications & Network Models** : Data Communications: Components, Data Representation and Data flow; Networks: Distributed Processing, Network Criteria, Network Models, Categories of networks and Internetwork; Internet and Protocols and Standards.

**Network Models**: Layered tasks, the OSI model, Layers in the OSI Model, TCP/IP protocol Suit, Addressing.

### Unit – II

**Data and Signals & Digital Transmission** : Data and Signals: Analog and Digital Data, Analog and Digital Signals, Periodic and Non periodic Signals, Transmission impairment. Data rate limits and Performance. Transmission modes.

**Transmission Media** : Guided media (Twisted Pair Cable, Coaxial Cable & Fiber-Optic Cable) and Unguided media :Radio wave, Infrared, Microwave Communication. Satellite. Geosynchronous Satellites Communication and optical fiber communication.

### UNIT-III

**Multiplexing & Switching** : Digital Transmission: Digital to Digital Conversion:- Line coding(Unipolar, Polar & Bipolar), Block Coding, Analog to Digital Conversion: PCM & DM, Digital to analog conversion : ASK,FSK,PSK & QAM, Analog to Analog conversion: Amplitude Modulation, Frequency Modulation & Phase Modulation.


**Multiplexing**: FDM, WDM, Synchronous TDM and Statistical TDM.

### UNIT-IV

**Error Detection and Correction** : Switching: Circuit switched networks, message switching & packet switching. Datagram networks, Virtual Circuit networks. Error Detection and Correction: Introduction, Block coding: Hamming Distance & Parity bit, linear block codes, cyclic codes: CRC, VRC & LRC, and Checksum.

**Data Link Control** : Data Link control: Framing, Introduction of Flow and Error Control. Elementary Data Link Protocols: - Simplest Protocol, Stop & Wait Protocol and Simplex protocol for a Noisy channels.

(17)

  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

## UNIT-V

**Networks Layer Functions and Protocols:** Routing, Routing algorithms, Network layer protocol of Internet- IP protocol, Internet control protocols.

**Transport Layer Functions and Protocols:** Transport services, Berkeley socket interface overview, Transport layer protocol of Internet- UDP and TCP. Overview of Application layer protocol: Overview of DNS protocol, Overview of WWW & HTTP protocol.

### Recommended Books :

1. Behrouz A Foruzan, Data Communication and Networking; 3<sup>rd</sup> Edition; Tata McGraw Hill.
2. Behrouz A Foruzan, TCP/IP Protocol Suite; 2<sup>nd</sup> Edition; Tata McGraw Hill.
3. Stalling William; Data and Computer Communication; 8<sup>th</sup> Edition Pearson.
4. Tannenbasum; Computer Networks; 4<sup>th</sup> edition, PHI.
5. Wayne tomasim electronic Communications Systems, Pearson, Education Asia.
6. M.A. Miller, Data and Network Communications, Thomosn Kearning
7. Gilbert Held, Understanding Data Communication, Techmedia.
8. Fred Harshal, Data Communications Communications, Networks, Pearson Education Asia.

### Practicals

Each practical paper shall be of 3 hours duration on one day and carry 100 marks for the practical examination. The practical examination will involve 3 exercises, each of 20 marks, practical record of 15 marks and viva-voce examination of 25 marks.

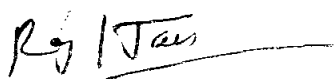
#### PGD 211: Java Lab

Lab Exercise on Theory Paper PGD 201.

#### PGD 212: Web Development Lab

Lab Exercise on Theory Paper PGD 202.

#### PGD --- : Elective – III Lab

  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

## Elective Theory papers for Elective Group-I of PG DCA Second Semester

### Elective I (Any One)

#### PGD A01: Data Structures and Algorithms

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### UNIT – I

**Introduction to Algorithm Design:** Algorithm, its characteristics, efficiency of algorithms, analyzing Algorithms and problems.

**Linear Structure:** Arrays, records, stack, operation on stack, implementation of stack as an array, queue, types of queues, operations on queue, implementation of queue.

#### UNIT – II

**Linked Structure :** List representation, Polish notations, operations on linked list - get node and free node operation, implementing the list operation, inserting into an ordered linked list, deleting, circular linked list, doubly linked list, implementation of stack and queues using linked list.

#### UNIT – III

**Tree Structure :** Concept and terminology, Types of trees, Binary search tree, inserting, deleting and searching into binary search tree, implementing the insert, search and delete algorithms, tree traversals , Huffman's algorithm.

#### UNIT – IV

**Graph Structure :** Graph representation - Adjacency matrix, adjacency list, Warshall's algorithm , adjacency multilist representation. Orthogonal representation of graph . Graph traversals - BFS and DFS. Shortest path, all pairs of shortest paths, transitive closure, reflexive transitive closure.

#### UNIT – V

**Searching and sorting :** Searching - sequential searching, binary searching, hashing. Sorting - selection sort, bubble sort, quick sort, heap sort, merge sort, and insertion sort, efficiency considerations.

#### Recommended reference books

1. S. Lioschutz: Data Structures, Mc Graw Hill International Edition.

2. A.V. Aho., J.E. Hopcroft, and J.D. Ullman, Data Structures and Algorithms, Pearson Education Asia.
3. R.S. Salaria; Data Structures & Algorithms Using C ;Fourth Edn;Khanna Book Pub.
4. R.B. Patel; Expert Data Structures with C ;Fourth Edn;Khanna Book Pub.
- A. Michael Berman: Data Structures via C++, Oxford University Press.
5. Sara Baase and Allen Van Gelder: Computer Algorithms, Pearson Education Asia.

### **PGD A02: Cloud Computing**

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### **Unit-I**

**Introduction of Cloud Computing:** Cloud computing, Enabling Technology, Vision, Characteristics and components of Cloud Computing. Challenges and Approaches of Migration into Cloud. Types of Clouds, Services models, Cloud Reference Model.

#### **Unit-II**

**Cloud Computing Architecture:** Data center Design and interconnection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Features of cloud programming, Parallel and distributed programming paradigms-MapReduce, Hadoop, High level Language for Cloud. Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish Subscribe Model

#### **Unit-III**

**Virtualization Technology:** Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms. Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server , Desktop, Network, and Virtualization of data-center.

#### **Unit-IV**

**Securing the Cloud:** Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture. Legal issues in cloud Computing. Data Security in Cloud: Risk Mitigation, Understanding and Identification of Threats in Cloud. SLA-Service Level Agreements, Trust Management.

## Unit-V

**Cloud Platforms in Industry:** Amazon web services, Google AppEngine, Microsoft Azure Design, Aneka: Cloud Application Platform -Integration of Private and Public Clouds Cloud applications: Protein structure prediction, Data Analysis, Satellite Image Processing, CRM and ERP, Social networking.

### Recommended Books:

1. Cloud Computing ,Principle and Paradigms, Edited By RajkumarBuyya, JamesBroberg, A. Goscinski, Pub.- Wiley-2016
2. Kumar Saurabh, "Cloud Computing" , Wiley Pub 2016
3. Distributed and Cloud Computing, Kai Hawang , GeoffreyC.Fox, Jack J. Dongarra Pub: Elsevier, 2013
4. Krutz , Vines, "Cloud Security " , Wiley Pub,2010
5. Velte, "Cloud Computing- A Practical Approach" ,TMH Pub,2009
6. Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer,2010

## PGD A03: Computer Architecture

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

## UNIT- I

**Boolean Algebra and Logic Gates:** Basic Gates, Basic laws of Boolean algebra, Simplification of Boolean algebra. Combinational Logic Design: Standards representation for logical expression, Minimization of logical functions in terms of Maxterm and Minterm, Simplifications of Boolean equations using K-maps, don't care conditions

## UNIT-II

**Arithmetic Circuits:** Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel Binary Adder, Parallel binary Subtractor, Parallel binary adder/Subtractor. Multiplexers, De-Multiplexers, decoders, encoders (Octal to binary, decimal to BCD, priority). BCD to Seven segment decoder.

**Sequential Logic:** Sequential circuits: Flip-flops, S-R, D, J-K, T, Clocked Flip-flop, Race around condition, Master slave Flip-Flop (truth tables, working)

### UNIT-III

**Register Transfer And Micro operations :** Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit.

**CPU design :** specifying a CPU, design and implementation of a simple CPU (fetching instructions from memory, decoding and executing instructions, establishing required data paths. Design and implementation of a simple micro sequencer.

### UNIT-IV

Basic Computer Organization And Design :Instruction Codes, Computer Registers: Common bus system: Computer Instructions: Instruction formats; Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle; Register reference instructions. I/O & Interrupt, types of Interrupts, Interrupt cycle. Central Processing Unit: Introduction, General Register Organization, Stack Organization: Register stack, Memory stack; Instruction Formats, Addressing Modes

### UNIT- V

Memory Organization : Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory. Multiprocessors: Characteristics of multi-processors inter connection structure; inter processor arbitration, inter-processor communication and synchronization.

#### Recommended Books

1. M, Morris Mano; Computer System Architectures; III Edition, Prentice Hall of India,2008
2. Andrew S. Tanenbaum , Structured Computer Organization,Printice Hall
3. William Stallings, Computer Organization and Architecture , Sixth Edition, Pearson
4. John D. Carpinelli: Computer Systems Organization & Architecture; 3rd Edition; Person Education Asia,2008
5. Malvino B ; Digital Computer Electronics III Edition; TMHL

*Rj/Tas*  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR

## Elective Theory papers for Elective Group-II of PG DCA Second Semester

### Elective II (Any One)

#### PGD B01: Python Programming

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

#### UNIT-I

**Python Concepts:** Origin, Comparison, Comments, Variables and Assignment. Identifiers. Basic Style Guidelines, Standard Types, Internal Types, Operators, Built-in Functions. Numbers and Strings. Sequences: Strings, Sequences, String-Operators & functions. Special Features of Strings, Memory Management, programs & examples.

**Conditionals and Loops:** if statement, else Statement, elif Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement

#### Unit-II

**Object and Classes:** Classes in Python, Principles of Object Orientation, Creating Classes. Instance Methods, Class variables, Inheritance, Polymorphism, Type Identification, Python libraries (Strings, Data structures & algorithms).

**Lists and Sets:** Built-in Functions, List type built in Methods, Tuples, Tuple Operators, Special Features of Tuples, Set: Introduction, Accessing, Built-in Methods (Add, Update, Clear, Copy, Discard, Remove), Operations (Union, Intersection, Difference).

#### Unit-III

**Dictionaries :** Introduction to Dictionaries, Built-in Functions, Built-in Methods, Dictionary Keys, Sorting and Looping, Nested Dictionaries.

**Files:** File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules.

#### Unit-IV

**Regular Expression:** Regular Expression: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python.

**Exceptions:** What Are Exceptions? Exceptions in Python, Detecting and Handling Exceptions. Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.

## Unit-V

**Database Interaction :** SQL Database Connection using Python, Creating and Searching Tables, Reading and storing config information on database, Programming using database connections, Python Multithreading: Understanding threads, Forking threads, synchronizing the threads, Programming using multithreading.

### Recommended Books:

1. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2nd Edition, 2018
2. Dr. M. Suresh Anand, Dr. R. Jothikumar, Dr. N. Vadivelan, "Python Programming", Notion Press, 1st Edition, 2020
3. Martin C. Brown, "The Complete Reference Python", McGraw Hill Education, 4th Edition, 2021.
4. Ashok Namdev Kamthane; "Programming and Problem Solving with Python"; 2nd Edn. MGH, 2020
5. Allen B. Downey, "Think Python", O'Reilly Media, 2016
6. Sakis Kasampalis, Quan Nguyen, Dr Gabriele Lanaro, Ingram, "Advanced Python Programming", short title, 2019
7. David M. Beazley, "Python Essential Reference", Amazon Books, 2010.
8. M. Lutz, "Programming Python, 4th Edition", O'Reilly Media, 2010

## PGD B02: PHP Programming

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

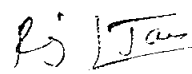
1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consist of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

## UNIT-I

**Introduction to PHP:** Installation of PHP and MySQL, PHP configuration in IIS & Apache Web Server. Features of PHP, Writing PHP, How PHP code is parsed, Embedding PHP and HTML Executing PHP and viewing in Browser.

### Unit - II

**Control Structures:** Data types, Operators, PHP variables: static and global variables. Comments in PHP, Control Structures, Condition statements, If...Else, Switch, ? operator. Loops, While, Break Statement Continue. Do...While, For, For each, Exit, Die, Return. Arrays: Numeric, Associative and Multidimensional Arrays.

  
Dy. Registrar (In-charge)  
University of Jaipur  
JAIPUR



### UNIT-III

**Strings:** Creating and accessing String, Searching & Replacing String, Formatting String, String Related Library function, Pattern matching, Replacing text, Splitting a string with a Regular Expression.

**Functions:** Defining a Function, Calling a Function, Parameter passing, Returning value from function

### UNIT-IV

**Form Data Handling:** \$\_GET, \$\_POST, \$\_REQUEST Variables, Cookies handling, Session Management

**Exception Handling:** Understanding Exception and error, Try, catch, throw

### UNIT-V

**File Handling:** Opening and closing a file, Copying, renaming and deleting a file

**Database Handling:** Connection with MySql Database or ODBC, Performing basic database operation (Insert, Delete, Update, Select, Truncate Alias, Order By), Setting query parameter.

#### Reference Books:

1. PHP, The CompleteReference, Steven Holzner, TMH
2. Beginning PHP 5.3, Matt Doyle, John Wiley & Sons
3. Core PHP Programming Leon Atkinson Pearson publishers
4. Beginning PHP 5.0 Database Christopher Scollo, Harish,Rawat, Deepak Thomas,Wrox Press

## PGD B03: Digital Marketing

Theory: 3 hours per week

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt six questions in all.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each taking two questions from each unit.
3. Question No. 2 to 6, each of 16 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

### UNIT – I

**Digital Marketing Fundamentals :** Marketing v/s Sales, Marketing Mix and 4 Ps, What is Digital Marketing, CRM platform, CRM models, CRM platform, Marketing Automation. Inbound vs Outbound Marketing, Content Marketing, Understanding Traffic, Understanding Leads, Strategic Flow for Marketing Activities.

(25)

Rg / Jee  
Unit  
2000

## Unit-II

**Website Planning and Structure :** Objective of Website and Flow, One Page Website, Google Analytics, Tracking Code, Website Auditing.

**Search Engine Optimization:** Basic Concepts, how Search Engine works, Keywords, Keywords, titles, meta tags, On page optimization techniques, Off page Optimization techniques. SEO Audit & Future of SEO.

## Unit-III

**Email Marketing:** Content Writing, Contents Writing Techniques and Tools, Email Machine -- The Strategy, Email Frequency, Triggers in Email using 4Ps, Sequence of Email Triggers, Email Software and Tools, Importing Email Lists, Planning Email Campaign. Email Templates and Designs, Sending HTML Email Campaigns, Web Forms Lead Importing, Integrating Landing Page Forms Campaign Reports and Insights.

## Unit-IV

Google Adwords : Basics, Google Ad Types, Pricing Models, PPC Cost Formula, Ad Page Rank. Billing and Payments, Adwords User Interface, Keyword Planning, Keywords Control, Creating Ad Campaigns, Creating Text Ads, Creating Ad Groups, Bidding Strategy for CPC.

## Unit-V

**Social Media Optimization (SMO) :** Introduction , Advanced Facebook Marketing, Word Press Blog Creation, Twitter Marketing, LinkedIn Marketing, Google Plus Marketing. Instagram. Social Media Analytical Tools, Scheduling Posts, Social media Events, Reply and Message. Social media Ad Campaigns & Components, Youtube Marketing: Channel Links. Channel Keywords, Branding Watermark, Uploading Videos, Featured Contents on Channel

### Recommended Books:

1. Ian Dodson, "The Art of Digital Marketing ", Wiley, 2018
2. Seema Gupta, "Digital Marketing" Mc-Graw Hill, 1<sup>st</sup> Edition, 2017
3. **References:** Puneet Singh Bhatia, "Fundamentals of Digital Marketing", Pearson. 1<sup>st</sup> Edition, 2017
4. Vandana Ahuja, "Digital Marketing", Oxford University Press
5. Philip Kotler, "Marketing 4.0: – Moving from Traditional to Digital", Wiley, 2017

-----XXXXX-----XXXXX-----XXXXX-----

*P. J. Das*  
Dy. Registrar (Acad.)  
University of Rajasthan  
JAIPUR