

SYLLABUS

for

Choice Based Credit System

(CBCS)

On the basis of

Outcome Based Education

(OBE)

**POST GRADUATE DIPLOMA IN COMPUTER
APPLICATIONS (PGDCA)**

PATNA WOMEN'S COLLEGE

PATNA UNIVERSITY

3rd Cycle NAAC Accredited at 'A' Grade with CGPA 3.58/4

"College with Potential for Excellence" (CPE) Status Accorded by UGC

Vision

Rooted in the life, vision, and teachings of Jesus Christ and inspired by Mother Veronica, the foundress of the Apostolic Carmel, Patna Women's College strives to become a centre of academic excellence in higher education, social responsibility, and empowerment of women.

Mission Statement

Patna Women's College, the first college for women in Bihar, is committed to the holistic development of women so as to make an effective contribution to the creation of a better society.

To this end, we strive

- To become a center of excellence in higher education for women in an atmosphere of autonomy.
- To excel in teaching-learning, research, and consultancy.
- To provide education that promotes capacity building and holistic development of a person.
- To offer subjects for competency building and motivate/animate a workforce imbued with human values.
- To promote patriotism, communal harmony and cultural integration to maintain a free and peaceful atmosphere on the campus.
- To train the students in creative arts, social service, critical thinking, and leadership in order to make an effective contribution to the creation of a new and value-based society.
- To create women leaders and to make them agents of social change.
- To develop skill oriented and value-based courses, for the all-round development of individuals.
- To promote academic exchange and academia-industry interface.
- To form young women who are 'always wise' and who will dare to 'go ahead and conquer knowledge' through, competence, commitment, delicate conscience, and compassion.

SYLLABUS

CHOICE BASED CREDIT SYSTEM COURSE

POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS (PGDCA)

COURSE AT A GLANCE

(COURSE – TWO SEMESTERS)

(1 Credit = 15 hrs) (Semester One = 25 credits)

(Semester Two = 25Credits)

Total Credits= 50

Programme Outcome

Upon completion of the programme, the students will attain the ability to:

PO1: Explain different computing paradigms (hardware & software) needed for a proper understanding of Computer Applications as a subject.

PO2: Comprehend, explore and develop computer programs in the allied area like algorithms, web design, data analytics etc. for efficient design of computer based systems.

PO3: Apply domain knowledge and expertise for enhancing educational pursuit and research capability.

PO4: Develop a range of Software skills applicable for employment.

PO5: Recognize and apply computing principles and Project Management in multidisciplinary environment.

PO6: Use the knowledge of advance technologies for developing customized solutions via startups and entrepreneurship.

Programme Specific Outcome

Upon completion of the programme, the students will attain the ability to:

PSO1: Aspiring for higher degrees and research work in computers.

PSO2: Attain specialization in specific domains of Computer Applications.

PSO3: Apply Knowledge in Software Development/ IT Sectors

PSO4: Apply skilled knowledge in Banking, Insurance, Teaching and other services in Corporate and Government sectors.

PSO5: Initiate startups and perform task as entrepreneurs in IT sectors

Semester – One

CORE PAPERS	NAME OF THE PAPER	CREDIT POINT
PGDCA C101	Computer Fundamentals	5 credits
PGDCA C102	Programming Using C	5 credits
PGDCA C103	MS Office	5 credits
PGDCA C104	Database Management Systems	5 credits
PGDCA C105	Data Communications & Networks	5 credits

Semester – Two

PGDCA C206	Software Engineering	5 credits
PGDCA C207	Programming in JAVA	5 credits
PGDCA C208	Operating System	5 credits
PGDCA C209	Internet and its Applications	5 credits

Discipline Specific Elective Paper

PGDCA DSE 201	Minor Project Work	5 credits
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Post Graduate Diploma in Computer Applications (PGDCA) Details of CBCS Syllabus

Core Papers

SEMESTER – I

PGDCA C101: Computer Fundamentals

COURSE OUTCOME

After completion of the course, the students will be able to:

CO1: Explain basic components, structure and functions of a Computer System

CO2: Classify the types of Software, Hardwares and Peripherals of Computer System

CO3: Outline the functions of Operating systems and Programming languages

CO4: Create and execute Batch files in DOS Environment.

<u>PGDCA C101 : Computer Fundamentals</u>		
PWC (Theory:3credits+ Practical:2credits)		
Units	Topics to be covered	No. of hours
1	Introduction and History of Computers, Characteristics of Computers, Basic Computer Organization, Classification of computers, Generations of Computers. Generation of Computer Languages, Translators, Application of Computers Input Devices, Pointing Devices, Handheld Devices, Optical Devices, Audio-Visual Input Devices, Output Devices	15
2	Computer Memory & Processor: Introduction, Memory Hierarchy, Processor Registers, Cache Memory, Primary Memory RAM & Types of RAM, ROM (PROM, EPROM, EEPROM), Secondary	10

	Storage Devices.	
3	Number systems – Decimal, Binary, Octal and Hexa-decimal number systems and their inter conversion, 1's & 2's complement, Arithmetic operations on Binary numbers, Overflow & underflow. Logic Gates, AND, OR, NOT, NOR, NAND & XOR gates, and their Truth tables	10
4	Introduction to Operating System External and Internal Commands of DOS, Basics of Windows	10
	DOS and Windows Lab	30
	TOTAL	75

Reading List

1. Abel Peter. (2000). *IBM PC Assembly Language and Programming*, PHI, New Delhi
2. Ram B. (2009) *Computer Fundamentals, Architecture and Organisation*, New Age International Publishers
3. Thareja Reema. (2014). *Fundamental of Computers* ,Oxford Publication New Delhi.
4. Sinha Pradeep Kumar & Sinha Priti. (2011). *Computer Fundamentals*, BPB Publication, New Delhi
5. Nagpal D.P. (2013). *Computer Fundamental Concepts System & Applications*, S.Chand, New Delhi

SEMESTER – I

PGDCA C102: Programming Using C

COURSE OUTCOME

After completion of the course, the students will be able to:

CO1: Recognize the basics of computer programming concepts using C Programming Language.

CO2: Explain the concept of C character set, identifiers and keywords, variable different data types, operators and programming constructs.

CO3: Apply the concept of advanced topics like Arrays, Functions, Pointers, Structures, Unions and Dynamic Memory Allocations and File Handling in various programmes

CO4: Create and execute different programmes using Procedural programming method.

PGDCA C102 : Programming Using C		
PWC (Theory:3credits+ Practical:2credits)		
Unit	Topics to be covered	No. of hours
1	Overview of Procedure Oriented Programming, Character set, keywords, Data types, Casting of Data Types, Variables, Scope of Variables, Operators, Understanding precedence of Operators in Expressions, Basic structure of a C program , Header Files, Compiling and Executing a C program, Using comments in programs.	5
2	I/O statements, Conditional Statements (IF, IF... ELSE, Nested IF, Switch-Case), Iterative Statements (FOR, WHILE, and DO-WHILE), Use of BREAK and CONTINUE in Loops, Nested loops.	10

3	Arrays (Declaring an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays), Introduction to Two-dimensional Arrays, String handling and manipulation in C. Pointers – Introduction to Pointers, Pointer Arithmetic, Pointers with Arrays, Structures, String	15
4	Structures in C (Declaring, initializing and using simple Structures), Array of Structures, Concept of Unions. Dynamic memory allocation, use of malloc(), calloc() , free() functions. User Defined Functions- Declaring, calling and defining a User defined function Concept of Pass by Value and Pass by Reference in a User Defined Function. Passing Simple variables, Arrays, Structures etc. in a User Defined Function. void functions, Functions returning values Storage classes in C	15
	Practical of C Programs	30
	TOTAL	75

Reading List

1. Kanetkar Yashvant. (2001). *Let us C*, B&B, New Delhi
2. Schildt Herbert. (2010). *The Complete Reference C*, Tata Mc Graw Hill, New Delhi
3. Kamthane Ashok N. (2012). *Programming in C*, Pearson, Noida
4. Jacqueline A. Jones & Keith Harrow. (2003). *C Programming with Problem Solving*, Dream Tech Press, New Delhi
5. Subburaj R. (2011). *Programming in C*, Vikas Publication House, Noida
6. Jeyapooran T. (2011). *Programming with C*, Vikas Publication House, Noida

SEMESTER – I

PGDCA C103: MS-Office

COURSE OUTCOME

After completion of the course, the students will be able to:

CO1: Recognize the basic knowledge of Windows Operating System.

CO2: Apply Microsoft Word tools to create professional documents.

CO3: Design, construct and analyze data using MS-Excel.

CO4: Create Presentations using MS- PowerPoint.

PGDCA C103 : MS OFFICE		
PWC (Theory:3credits+ Practical:2credits)		
Units	Topics to be covered	No. of hours
1	Introduction to Ms-Office, MS-Windows: Desktop and Screensaver Creating and Renaming Folders, Taskbar	5
2	MS-Word :- Parts of window of word (Title bar, menu bar, status bar, ruler), Creation of new documents, opening document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header & footer, deleting, moving, replacing, editing text in document. Saving a document, spell checker, printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height width of row or column. Editing, deleting Rows, columns in table. Borders & shading, Templates, Mail Merge, Macro	10
3	MS-PowerPoint: Introduction to Ms Powerpoint, PowerPoint elements (templates, wizard, views, color schemes), exploring PowerPoint menu (opening & closing menus, working with dialogues boxes), adding text, adding title, moving text area,	15

	resizing text boxes, adding pictures. Starting a new slide, saving presentation, printing slides .Views (slide view, slide sorter, outline view) .Formatting & enhancing text formatting, Choosing transitions. Creating a graph, displaying slide show, adding multimedia .Slide transitions. Timing slide display, adding movies & sounds.	
4	MS-Excel: Introduction to Worksheet/Spreadsheet, Features of excel. Describe the excel Window, different functions on different data in excel, creation of graphs, editing it and formatting, changing chart type to 2D chart or 3D chart, creation of worksheet, adding, deleting, moving the text in worksheet, linking different sheets, sorting the data, filtering the data (auto and advance filters), What-if analysis, printing a worksheet. Protecting sheet.	15
	LAB of MS – Office	30
	TOTAL	75

Reading List

1. Bott Ed, Slechert Carl (2014). Microsoft Office Inside out : 2013 Edition, PHI Learning Pvt Limited, New Delhi
2. Bucki Lisa A., Walkenbach John, Wempen Faithe, Alexander Michael, Kusleika Dick, (2014) Microsoft (R) Office 2013 Bible, Wiley India Pvt India.
3. Shrivastava Dr. S.S., (2008), MS-Office, Firewall Media, Laxmi Publications, New Delhi
4. Maidasani Dinesh (2005), Learning Computer Fundamentals, Ms Office and Internet & Web Tech., Firewall Media, Laxmi Publications, New Delhi
5. Lambert Joan , Frye Curtis (2015), Microsoft Office 2016 Step by Step, Microsoft Press.

SEMESTER – I

PGDCA C104: Database Management Systems

COURSE OUTCOME

After completion of the course, the students will be able to:

CO1: Understand the fundamental elements of Database Management System using basic concepts of data model, entity-relationship model, database design etc.

CO2: Design ER-Models to represent simple database application scenarios and convert them into tables.

CO3: Implement Normalization for the optimization of Database Design

CO4: Formulate queries using SQL for effective information storage and retrieval in a Database

PGDCA C104 : Database Management System		
PWC (Theory:3credits+ Practical:2credits)		
Units	Topics to be covered	No. of hours
1	Concept of Database and DBMS, Characteristics of database approach, Role of DBMS, Data models (Relational, Hierarchical, Network and Object-Oriented), Layered Architecture of DBMS.	5
2	Entity Relationship(ER) Modeling, Concept of Keys, Database design, Data dependencies: functional, transitive Normal forms: 1NF, 2NF, and 3NF.	10
3	Database transactions: Transaction Processing, ACID properties, Concurrency Control.	15
4	Structured Query Language : DDL, DML, DCL and TCL Introduction to PL/SQL	15
	LAB of Structured Query Language	30
	TOTAL	75

Reading List

1. Silberschatz,A. Korth H. F. and Sudarshan S. (2011). *Database Systems Concepts*, Tata McGraw Hill, New Delhi
2. Elmasri Ramez , Navathe Shamkant B. (2016). *Fundamentals of Database Systems* Pearson Education Limited, New Delhi
3. Chopra Dr. Rajiv. (2010) *Database Management System (DBMS) A Practical Approach*, S Chand Publications, New Delhi
4. Bayross Ivan, (2009). **SQL, PL/SQL: The Programming Language of Oracle**, BPB Publications, New Delhi
5. Schwarz Baron, (2012) *High Performance My SQL*, O'Reilly, USA

SEMESTER – I

PGDCA C105: Data Communications & Networks

COURSE OUTCOME

After completion of the course, the students will be able to:

CO1: Recognise the structure of Data Communications System and its components and basics of Networking.

CO2: Explain the concepts of Network models (OSI and the TCP/IP Reference models), their functions of OSI Layers and different Protocols used in these Model..

CO3: Illustrate various Networking devices and their functions, Multiplexing, Switching Techniques, IP Addressing.

CO4: Illustrate different Transmission media, Flow control and Error Detection Techniques.

PGDCA C105 : Data Communication and Networks		
PWC (Theory:4credits+ Tutorial:1credit)		
Units	Topics to be covered	No. of hours
1	Introduction to Data Communication: Characteristics, Components, Data Representation, Transmission Modes ,	15

	Introduction to Computer Network : Network Criteria, Types of Network – LAN, WAN, MAN, Network Topologies: Star, Ring, Bus, Mesh, Introduction to Internet	
2	Overview of OSI Reference Model and TCP/IP protocol suite Characteristics of Physical Layer, Analog and Digital Signal, Transmission Media,	15
3	Connecting Devices- HUB, Switch, Bridge, Repeater, Router, Gateway and NIC Characteristics of Data Link Layer, Framing, Introduction to Flow and Error Control Characteristics of Network Layer, IP Addressing	15
4	Transport Layer : Functionalities of Transport Layer, Session Layer, Presentation Layer and Application Layer. Protocols: TCP, IP, HTTP, SMTP, FTP, TELNET Introduction to DNS	15
	Tutorial	15
	TOTAL	75

Reading List:

1. Forouzan Behrouz A. (2003). *Data Communication and Networking*, Tata Mc Graw Hill, New Delhi
2. Commerce Douglas E., (2004). *Computer Network and Internet*, Pearson Education, New Delhi
3. Lingana Fred Halsall and Kulkarni Gouda, (2007). *Computer Networking and the Internet*, Pearson Education, Noida
4. Black Uyles, (1993). *Computer Network Protocol, Standard and Interfaces*, PHI Learning Pvt. Ltd., New Delhi
5. Kurose James F. & Ross Keith W., (2012). *Computer Networking A Top-down approach*, Pearson, Noida
6. Tannenbaum Andrew S. & Wetherall David J., (2012). *Computer Networks*, Pearson, Noida

SEMESTER II

PGDCA C206: Software Engineering

COURSE OUTCOME

After completion of the course, the students will be able to:

CO1: Illustrate the basics of software – its characteristics, SRS and its components.

CO2: Classify the fundamentals of different software process models & techniques to construct larger and more complex software systems

CO3: Apply software engineering concepts to design, develop and maintain the software.

CO4: Implement Software Testing for good Software Quality Assurance.

PGDCA C206 : Software Engineering		
PWC (Theory:4credits+ Tutorial:1credit)		
Units	Topics to be covered	No. of hours
1	The Evolving Role of Software, Software Characteristics, Software Engineering Approach, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI).	15
2	Software Requirement Analysis: Requirement Analysis and Modelling Techniques, Flow Oriented Components of SRS, Need for SRS, Software Project Management : Project Estimation, Project Scheduling, Risk Management.	15
3	Software Design: Design Concepts, Approaches to Software Design, Introduction to User Interface Design, Software Coding	15
4	Software Testing: Strategic Approach to Software Testing, System Testing, Black-Box Testing, White-Box Testing, Unit Testing. Software Quality: Software Quality Assurance	15
	Tutorial	15
	TOTAL	75

Reading List:

1. Pressman R.S. (2001). *Software Engineering A Practitioner's Approach* ,MC Graw Hill
New Delhi
2. Mall Rajiv, (2014). *Fundamentals of Software Engineering* , PHI Learning Pvt. Ltd,
India
3. Sabharwal Sangeeta. (2008) *Software Engineering*, New Age International, New
Delhi
4. Stephens Rod., (2015). *Begining Software Engineering*, Willey India, New Delhi.
5. Aggarwal K.K. (2005). *Software Engineering*, New Age International, New Delhi

SEMESTER – II

PGDCA C207: Programming in JAVA

COURSE OUTCOME

After completion of the course, the students will be able to:

CO1: Describe the fundamental concepts and features of Java Programming language.

CO2: Implement Object Oriented Programming Concepts (class, constructor, overloading, inheritance, overriding) in java.

CO3: Implement concepts of Multithreading and Exception Handling in Java.

CO4: Create and Use Packages and Interfaces in a Java program and Develop Graphical User Interface applications and Web based applications in Java by importing applet, AWT.

PGDCA C207 : Programming in JAVA		
PWC (Theory:3credits+ Practical:2credits)		
Units	Topics to be covered	No. of hours
1	Java Architecture and Features, Difference between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords, Data Types, Operators,	5

	Expressions, Executing Basic Java Programs, Conditional and looping statements.	
2	Java Methods, Definition, Scope, Passing and Returning Arguments, Type Conversion and Type Checking, Built-in Java Class Methods, Using Arrays (1-D and 2-D), Java Strings: Java String class, Creating and Using String Objects, Manipulating Strings.	10
3	Defining and Using Classes in Java, Controlling Access to Class Members, Constructors, Method Overloading, Class Variables and Methods, Objects as parameters, final keyword	15
4	Inheritance (Single Level and Multilevel), Method Overriding, Interfaces and Packages, Introduction to Applets, Writing Java Applets.	15
	Programming in JAVA	30
	TOTAL	75

Reading List:

1. Balaguruswamy E. (2014), *Programming with Java ,4th Edition*, McGraw Hill ,New Delhi
2. Malhotra Sachin and Choudhury Saurabh. (2003). *Programming in Java*, Oxford University Press, New Delhi
3. Hubbard John R. (2004). *Programming with JAVA Schaum's Series*, McGraw Hill, New Delhi
4. Sagayaraj S., Denis R , Karthik P and Gajalakshmi D, (2018). *Java Programming*, Universities Press, Hyderabad
5. Schildt Herbert, (2010). *Java: A Beginner's Guide*, Oracle Press, New York
6. Majithia Ravi. (2015). *Java EE: from Trainee to Trained*, Himalaya Publishing House, Mumbai

SEMESTER – II

PGDCA C208: Operating System

COURSE OUTCOME

After completion of the course, the students will be able to:

CO1: State the Role of System Software (Operating System) in Computers.

CO2: Describe the important Computer System resources and the Role of OS in their management policies and algorithms

CO3: Analyse different types of Operating Systems (DOS, Windows, UNIX).

CO4: Create and execute Shell Scripts in Linux.

PGDCA C208 : Operating System		
PWC (Theory:3credits+ Practical:2credits)		
Units	Topics to be covered	No. of hours
1	Introduction to Operating system, Types of operating systems, Functions of OS, Operating General working of an Operating System, System Calls.	5
2	Process Management- Life cycle of a Process, Process State Transition Diagram, Process Control Block and Implementation of processes, Context Switch, Schedulers, Process Scheduling Algorithms: Non-pre-emptive and pre-emptive scheduling algorithms- First Come First Serve, Shortest Job First, Round Robin, Priority Scheduling Concept of deadlock and its prevention, detection and recovery.	15
3	Introduction to Memory Management: Contiguous and Non-contiguous memory allocation and partition allocation algorithms Disk Management and Disk Scheduling algorithms	15

	Introduction to I/O Management and Introduction to File System	
4	UNIX Basic Commands, vi editor and Shell Scripts	10
	Lab of UNIX	30
	TOTAL	75

Reading List

1. Silberschatz Abraham , Galvin Peter Baer and Gagne Greg. (2006). *OPERATING SYSTEM PRINCIPLES*, John Wiley & Sons, New Delhi
2. Chauhan Naresh, (2014). *Principles of Operating System*, Oxford University Press, New Delhi
3. Stallings William, (2017). *Operating System Internal & Design Principles*, Pearson, Noida
4. Tanenbaum Andrew S., (2012)., *Modern Operating System*, PHI, New Delhi
5. Harvey M. Deitel Paul J. Destel David R. Choffnes, (2012). *Operating System*, Pearson, Noida
6. Harwani B.M.. (2015). *UNIX and SHELL*, Oxford Higher Education, New Delhi
7. Sriengnan K. (2008). *Understanding UNIX*, PHI, New Delhi
8. Das Sumitabha (2008). *UNIX Concepts and Applications*, McGraw Hill, New Delhi

SEMESTER – II

PGDCA C209: Internet and its Applications

COURSE OUTCOME

After completion of the course, the students will be able to:

CO1: Understand the basics of Internet and its usage as a learning resource and communication system.

CO2: Apply HTML for Website development.

CO3: Analyse the basics of E-Commerce and digital payment.

CO4: Use web services like E-mail, Search Engines etc.

PGDCA C209 : Internet and its Applications		
PWC (Theory:3credits+ Practical:2credits)		
Units	Topics to be covered	No. of hours
1	History of Internet, Personal Computers History of World Wide Web. Web Browsers, Internet Explorer, Searching the Internet, online help and tutorials, File Transmission Protocol (FTP) Browser settings.	10
2	Attaching a file, Electronic Mail : Creating an e-mail id , Sending and Receiving mails, attaching a file, Instant messaging, other web browsers.	10
3	Introduction to HTML headers, Hyperlinks, ordered and unordered lists, Handling Tables, Inserting Images and Marquee, Simple HTML programs.	20
4	Introduction to E-Commerce, Introduction to Digital Payment.	5
	Lab of Internet and HTML	30
	TOTAL	75

Reading List

1. Deital H.M., Deital P.J. and Goldberg A.B., Internet and World Wide Web Third edition, PHI Learning Pvt. Ltd.
2. Hahn Harley, The Internet- Complete Reference, Tata McGraw Hill.
3. Freire Mario, Pereira Manuela, Encyclopedia of Internet Technologies and Applications by, 1st Edition.
4. Bangia Ramesh, (2011). *Multimedia & Web Technology*, Khanna Book Publishing CO (P) Ltd, New Delhi

SEMESTER- II

PGDCA DSE 201: Project Work **Discipline Specific Elective Paper**

Course Outcomes:

After the completion of the course, the students will attain the ability to:

CO1: Formulate projects with clearly identified scope and requirements.

CO2: Understand the practical implementation of Software Development Life Cycle.

CO3: Implement programming theories, concepts and principles & use latest computing tools for Software Development.

CO4: Develop team building capacity and work ethics for successful project development and management.

PGDCA DSE 201 : Minor Project Work

PWC (Practical :5credits)

A student has to undertake a software development project work/ Website Development / App Development during the 2nd semester. After completion of the project, the student has to submit a project report which will be evaluated by an External Examiner.