Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

For

M. Sc. (Computer Science)

Semester-II

(Effective from the session: 2022-23)

Faculty of Science
Shri Rawatpura Sarkar University, Raipur
M. Sc. (Computer Science)
Semester - II
Examination Scheme
(Effective from the session: 2022-23)

Sr. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1	SMS04201	Advanced Database Management System	3	1	-	4	30	70	100	3 Hr.
2	SMS04202	Python Programming	3	1	-	4	30	70	100	3 Hr.
3	SMS04203	Software Engineering	3	1	-	4	30	70	100	3 Hr.
4	SMS04204	Sampling Methods	3	1	-	4	30	70	100	3 Hr.
5	SMS04205	Big Data	3	1	-	4	30	70	100	3 Hr.
6	SMS04291	ADBMS Lab	-	-	4	2	15	35	50	3 Hr.
7	SMS04292	Python Programming Lab	-	-	4	2	15	35	50	3 Hr.
Total Contact hr. per week: 28			**Total Credit**			**24**	**180**	**420**	**600**	

Course Title	**ADVANCED COMPUTATIONAL METHODOLOGY**			
Course Code	**SMS04-201**			
Course Credits	**L**	**T**	**P**	**TC**
	4	**-**	**-**	**4**
Prerequisites	Basic knowledge about mathematics.			
Course Objectives	• To represent the problems mathematically and optimize the solution. • To analyze the result numerically and linguistically by fuzzy theory.			
Course Contents	**UNIT - I** Graph theory and its application: - Basic Terminology. Simple graph. Multi graph. Types of graph Path, Cycles, Eulerian and Hamiltonian graph. Shortest path problem Representation of graph. Trees and their properties. Spanning Tree. Binary Tree. Tree traversal. **UNIT - II** Fuzzy sets and its Application: - Fuzzy sets-Basic definitions, α-level sets. Convex fuzzy sets. Basic operations on fuzzy sets. Types of fuzzy sets. Cartesian products, Algebraic products. Bounded sum and difference, t-norms and t-conforms. The Extension Principle The Zadeh's extension principle. Image and inverse image of fuzzy sets. Fuzzy numbers. Elements of fuzzy arithmetic. **UNIT - III** Cryptography and its application: -Introduction to the Concepts of Security: The need for security, Security Approaches, Principles of Security, &Types of Attacks. Cryptographic Techniques: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption & Decryption, Symmetric & Asymmetric Key Cryptography, Steganography, Key Range, Key Size, Possible Types of Attacks. DES, RSA, Digital Signature. **UNIT - IV** Statistical Analysis: -Expectation and variance of random variable. Sampling Distribution. Testing a Hypothesis. Level of significance. Confidence limits. Test of significance for large sample. Central limit theorem. Test of significance for means of two large samples. Sampling Variables-small samples. Student t-distribution, Chi-square test.			

	UNIT – V Optimization Techniques: -Dynamic Programming - Deterministic and Probabilistic Dynamic programming. Inventory- Basic characteristics of an inventory system. The Economic order quantity. Deterministic models. Network analysis (PERT/ CPM).
Course Outcomes	• This is the foundation of research & development in the computational domain of engineering and technology. • As the prerequisite, this will be traced the thought & ideas to design the behavioral tools over the engineering range.
Text Books	1. Jain R.K, Iyengar. S.R.K. - Advanced Engineering Mathematics, Narosa publications. 2. Grewal, B.S-Numerical Methods in Science and Engineering, Kanna Publications.
Reference Books	1. Kandasamy.P, Thilagavathy. Kand Gunavathy, K-Numerical Methods, S.Chandand Co., Ltd., New Delhi, S. P. Gupta. Statistical Method. Sultan Chand & Sons. 2011. 2. Prem Kumar Gupta & D. S Hira. Operation Research. S. Chand Publishing. New Delhi.

Course Title	**ADVANCED DATABASE MANAGEMENT SYSTEM**			
Course Code	**SMS04-202**			
Course Credits	**L**	**T**	**P**	**TC**
	4	**-**	**-**	**4**
Prerequisites	Students should be able to understand the basic knowledge of database Programming and SQL.			
Course Objectives	- To understand basic concepts of designing and building a database management system. - To familiarize student with syntax and implementation of Structured Query Language (SQL). - To make students understand the relational model and design relational database management system. - To provide detailed knowledge of transaction, concurrency and recovery strategies of DBMS. - To impart significance of normalization in DBMS and different normalization techniques.			
Course Contents	**UNIT - I** Formal review of relational database and FDs Implication, Closure, its correctness. **UNIT - II** 3NF and BCNF, Decomposition and synthesis approaches, Review of SQL99, Basics of query processing, external sorting, file scans. **UNIT - III** Processing of joins, materialized vs. pipelined processing, query transformation rules, DB transactions, ACID properties, interleaved executions, schedules, serialisability **UNIT - IV** Correctness of interleaved execution, Locking and management of locks, 2PL, deadlocks, multiple level granularity, CC on B+ trees, Optimistic CC. **UNIT - V** T/O based techniques, Multiversion approaches, Comparison of CC methods, dynamic databases, Failure classification, recovery algorithm, XML and relational databases.			

Course Outcomes	• Exposure for students to write complex queries including full outer joins, self- join, sub queries, and set theoretic queries. • Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques
Text Books	1. R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw Hill, 2004 2. A. Silberschatz, H. Korth, S. Sudarshan, Database system concepts, 5/e, McGraw Hill, 2008.
Reference Book	1. K. V. Iyer, Lecture notes available as PDF file for classroom use. 2. Sql/ Pl/SQL Bayross, Ivan BPB.

Course Title	**SOFTWARE ENGINEERING**			
Course Code	**SMS04-203**			
Course Credits	**L**	**T**	**P**	**TC**
	4	**-**	**-**	**4**
Prerequisites	Students should be able to understand the basic knowledge of Programming languages to make the Project.			
Course Objectives	- To provide knowledge to identify problems associated with conventional software development process models and solving through modern component based software development process models. - To provide knowledge to develop software requirement specification. - To represent workflow environment in the software industry. - To provide knowledge to estimate various checkpoints during software development. - To provide comprehensive knowledge for software project development and assessment.			
Course Contents	**UNIT - I** **Introduction:** The Software and software engineering problem, approach and goals of software engineering , software process characteristics of a software process, software development process, project management process, software configuration management(SCM) process, Software Development Models: Linear sequential(Waterfall Model, Prototyping, RAD Incremental Model, Spiral Model, Win win model, concurrent development model **UNIT - II** **Software Requirement Specification(SRS) and cost Estimation**: Need of SRS, Components of SRS, Structure of a requirement document, Cost Estimation , Uncertainties in cost estimation building cost estimation, Size estimation through delivered function point(DFP) and source line of code(SLOC), Cost estimation Model- COCOMO. **UNIT - III** **Software Management Renaissance :** Conventional Software Management, Evolution of software economics, improving software economics, the old way and the new way, life cycle phases, artifacts of process, model based software architecture, workflows of the process, checkpoints of the process. **UNIT - IV** **Software Management Discipline :** Interactive Process planning, Project Control and process instrumentation, tailoring the process, looking forward:			

	Modern Project profiles, next generation software economics, and modern process transitions, are testing in the transition phase. **UNIT - V** **Project Quality and Risk Plan:** Quality concepts procedure approach to quality management, quantitative approaches to quality management, quantitative quality management planning, setting the quality goal, quality process planning, defect prevention planning. Concept of risk and risk management, risk assessment, risk identification, risk prioritization, risk control- risk management planning, risk monitoring and tracking, Team development, The structure of the project management plan(PMP), PMP of Infosys.
Course Outcomes	• The student will have a fair idea about the importance of using software engineering principles in real life projects • The student will be able to prepare software requirement sheet for a real life project, keeping in mind the properties of an SRS document. • The student will be able to use mathematical models for calculating the size, cost and duration of real life projects • The student will be able to develop quality planning either through procedural as well as quantitative approach. • The student will be able to develop project manufactured documents (i.e., artifacts) for all phases of development to minimize risk and improvement of quality.
Text Books	1. Pressman Roger, Software Engineering: A Practitioner's Approach TMH, Delhi. 2. Walker Royce, "Software Project Management", Pearson Education.
Reference Books	1. JalotePankaj: An Integrated Approach to software Engineering, Narosa, Delhi. 2. JalotePankaj : Software Project Management in Practice, Addison Wesley. 3. R.E. Fairly, Software Engineering Concepts, McGraw Hill, Inc 1985. 4. Rajib Mall, "Fundamental of Software Engineering" , PHI. 5. B. Hughes & MCotterell, Software Project Management, TMH.

Course Title	**HIGH SPEED COMPUTER NETWORK**			
Course Code	**SMS04-204**			
Course Credits	**L**	**T**	**P**	**TC**
	4	**-**	**-**	**4**
Prerequisites	Basic knowledge about computers Network models and its networks and network			
Course Objectives	- To differentiate and understand low-level networks and high-level networks and network models. - To understand protocols and programming networks and network layer, its design issues. - To understand the use of networks and appropriate to specific networks functionality and its problems. - Demonstrate the use of various networks connections. - Demonstrate the use of the various control of networks its category.			
Course Contents	**UNIT - I** Introduction: Computer network design requirements, Network architecture, Implementing network software, Performance. Direct Link Networks: Hardware building blocks, Encoding, Framing, Error detection, Reliable transmission, Ethernet (802.3), Token Rings (802.5, FDDI), Wireless (802.11). **UNIT - II** Packet Switching: Switching and Forwarding, Bridges and LAN switches, Cell switching (ATM), Implementation and performance. Internetworking: Simple internetworking (IP), Routing, Global Internet, Multicast, Multiprotocol Label Switching (MPLS). **UNIT - III** End-to-End Protocols: Simple Demultiplexer (UDP), Reliable Byte Stream (TCP). Congestion Control and Resource Allocation: Issues in resource allocation, Queuing disciplines, TCP congestion control, Congestion avoidance mechanisms, Quality of Service. **UNIT - IV** Applications: Name Service (DNS), Electronic Mail, World Wide Web, Real-time Transport Protocol, Session control and call control, Overlay networks. **UNIT - V**			

	Network Management: Network monitoring and control, SNMP –V1, V2 & V3, RMON and RMONV2.
Course Outcomes	After completion of the course study, students will be able to :- 1. Use and differentiate between basic concepts of computer network and network layer, its issues. 2. how to solved the network layer problems and issues Read, trace and understand and network problems and troubleshooting that problems. 3. Analyse network problems and resolved.
Text Books	1. Larry L. Peterson & Bruce S. Davie, Computer Networks – A Systems Approach, Morgan Kaufmann Publishers, 3rd Edition, 2003. 2. William Stallings, SNMP, SNMPV2, SNMPV3, RMON1 and 2, Addison Wesley, 3rd Edition, 1999.
Reference Books	1. Mani Subramanian, Network Management: Principles and Practice, Addison Wesley, 2000. 2. James F. Kurose and Keith W. Ross, Computer Networking – A Top-down approach featuring the Internet, Addison Wesley, 3rd Edition, 2004. 3. S. Keshav, An Engineering approach to Computer Networks, Addison Wesley,1997. 4. R. Perlman, Interconnections – Bridges, Routers, Switches, and Internetworking Protocols, 2nd Edition, Addison Wesley, 2000.

Course Title	**ADVANCED JAVA**				
Course Code	**SMS04-205**				
Course Credits	**L**	**T**	**P**	**TC**	
	4	**-**	**-**	**4**	
Prerequisites	• Students should be able to understand the basic knowledge of Java Programming and its Structure.				
Course Objectives	• To use Java in a variety of technologies and on different platforms. • To have basic knowledge of Servlets. • To have knowledge of JSP,JDBC and EJB.				
Course Contents	**UNIT- I Servlets:** Servlet Structure, Servlet packaging, HTM building utilities, Lifecycle, Single Thread model interface, Handling Client Request : Form Data, Handling Client Request: HTTP Request Headers. Generating server Response: HTTP Status codes, Generating server Response: HTTP Response Headers, Handling Cookies, Session Tracking. **UNIT-II JSP:** Overview of JSP Technology, Need of JSP, Benefits of JSP, Advantages of JSP, Basic syntax, Invoking java code with JSP scripting elements, creating Template Text, Invoking java code from JSP, Limiting java code in J S P , using jsp expressions, comparing servlets and jsp, writing script lets. For example Using Scriptlets to make parts of jsp conditional, using declarations, declaration example. Controlling the Structure of generated servlets: the JSP page directive, import attribute, session attribute, is Elignoreattribute, buffer and auto flush attributes, info attribute ,errorPage and is errorPageattributes, is Thread safe Attribute, extends attribute, language attribute, Including files and applets in jsp Pages, using java beans components in JSP documents **UNIT-III Java Beans & Annotations:** Creating Packages, Interfaces, JAR files and Annotations. The core java API package, Newjava. Lang Sub package, Built-in Annotations. Working with Java Beans. Introspection, Customizers, creating java bean, manifest file, Bean Jar file, new bean, adding controls, Bean properties, Simple properties, Design Pattern events, creating bound properties, Bean Methods, Bean an Icon, Bean info class, Persistence ,Java Beans API. **UNIT-IV JDBC:** Talking to Database, Immediate Solutions, Essential JDBC program, using prepared Statement Object, Interactive SQL tool. JDBC in Action Result sets,				

| | Batch updates, Mpping, Basic JDBC data types, Advanced JDBC data types, immediate solutions.

UNIT-V Introduction to EJB:
The Problem domain, Breakup responsibilities, Code Smart not hard, the Enterprise java beanspecification. Components Types. Server Side Component Types, Session Beans, MessageDriven Beans, Entity Beans, The Java Persistence Model. Container services. DependencyInjection, Concurrency, Instance pooling n caching, Transactions, security, Timers,Naming and object stores, Interoperability, Life Cycle Callbacks, Interceptors, platformintegration. Developing your first EJB. preparation, Definitions, naming conventions,convention for the Examples, coding the EJB, the contract, the bean Implementation class,out of Container Testing, Integration Testing. |
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| **Course Outcomes** | - After completion of this course the students will be able to apply their basic knowledge of Java programming.

- The student will be able to: Use an integrated development environment to write, compile, run, and test advance object-oriented Java programs.

- Read and make elementary modifications to Java programs that solve real- world problems. |
| **Text Books** | 1. Java complete reference - by Patrick naughten & MesutScpddt. [TMH]

2. Java Primer - by E.Balaguruswami.

3. Johannes Gehrke, TATA McGraw Hill 3rd Edition.

4. Java Programming - Khalid Mughal |
| **Reference Books** | 1. JAVA: The Complete Reference by Naughton & Schildt - Tata McGraw Hill,1999

2. An Introduction to Java Programming by Daniel Liang Y - , Prentice-Hall India, 1999 |

Course Title	ADVANCED DATABASE AMNAGEMENT SYSTEM LAB			
Course Code	SMS04-291			
Course Credits	**L**	**T**	**P**	**TC**
			4	**2**
Prerequisites	Basic knowledge about Database Management System.			
Course Objectives	• To explore the features of a Database Management Systems. • To interface a database with front end tools. • To understand the internals of a database system.			
Course Content	1. Basic SQL. 2. Intermediate SQL. 3. Advanced SQL. 4. ER Modeling. 5. Database Design and Normalization. 6. Accessing Databases from Programs using JDBC. 7. Building Web Applications using PHP & MySQL. 8. Indexing and Query Processing. 9. Query Evaluation Plans. 10. Concurrency and Transactions.			
Course Outcomes	1. Ability to use databases for building web applications. 2. Gaining knowledge about the internals of a database system.			
Text Books	1. R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw Hill, 2004 Silberschatz, H. Korth, S. Sudarshan, 2. Database system concepts, 5/e, McGraw Hill, 2008.			
Reference Books	1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011 2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addision wesley, 2007.			

Course Title	**ADVANCED JAVA LAB**				
Course Code	**SMS04-292**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	Basic knowledge about Java programming language.				
Course Objectives	• Using Graphics, Animations and Multithreading for designing Simulation and Game based applications. • Design and develop GUI applications using Abstract Windowing Toolkit (ATW), Swing and Event Handling. • Design and develop web applications • Designing Enterprise based applications by encapsulating an application's business logic. • Designing applications using pre-built frameworks.				
Course Contents	**List of Experiments** 1. Write a JAVA Servlet Program to implement a dynamic HTML using Servlet (user name and Password should be accepted using HTML and displayed using a Servlet). 2. Write a JAVA Servlet Program to Auto Web Page Refresh (Consider a webpage which is displaying Date and time or stock market status. For all such type of pages, you would need to refresh your web page regularly; Java Servlet makes this job easy by providing refresh automatically after a given interval). 3. Write a JAVA Servlet Program to implement and demonstrate get() and Post methods(Using HTTP Servlet Class). 4. Write a JAVA Servlet Program using cookies to remember user preferences. 5. Write a JAVA JSP Program to implement verification of a particular user login and display a Welcome page. 6. Write a JSP program to demonstrate the import attribute. 7. Write a JAVA JSP Program which uses jsp:include and jsp:forward action to display a Webpage. 8. Write a JAVA JSP Program which uses tag to run a applet. 9. Write a JAVA JSP Program to get student information through a				

	HTML and create a JAVA Bean class, populate Bean and display the same information through another JSP. 10. Write a JAVA Program to insert data into Student DATA BASE and retrieve info based on particular queries(For example update, delete, search etc)…. 11. Write a JSP program to implement all the attributes of page directive tag. 12. An EJB application that demonstrates Session Bean (with appropriate business logic).
Course Outcomes	• Learn the Internet Programming, using Java Applets • Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (ATW) & Swings • Apply event handling on ATWand Swing components. • A learn to access database through Java programs, using Java Data Base Connectivity (JDBC) • Create dynamic web pages, using Servlets and JSP. • Make a reusable software component, using Java Bean. • Invoke the remote methods in an application using Remote Method Invocation (RMI) • Understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB)
Text Books	1. Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills 2. Head First EJB 3.0 by Kathy Sierra, Bert Bates, Publisher: O'Reilly Media 3. Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media.
Reference Books	1. Just Hibernate, A Lightweight Introduction to the Hibernate Framework by Madhusudhan Konda, Publisher: O'Reilly Media 2. Programming Jakarta Struts, 2nd Edition by Chuck Cavaness, Publisher: O'Reilly Medi