NIT SCHEME
COURSE OF STUDY AND SCHEME OF EXAMINATION OF B.TECH./B.ARCH./M.TECH/M.C.A.
NATIONAL INSTITUTE OF TECHNOLOGY OF RAIPUR

Branch:- **Master of Computer Applications (M.C.A.)**   Course:- **P.G.**
Semester:- **IIIrd Sem.**

S. No.	Board of Study	Subject Code	Subject Name	Period Per Week			Scheme of Examination			Total Marks	Credit [L+(T+P)/2]
				L	T	P	ESE	CT	TA		
1.	MASTER OF COMP. APP.	CA40311(CA)	Computer Networks and Communication	4	1	0	100	20	20	140	5
2.	MATHS	MA40312(CA)	Computer Oriented Optimization	4	1	0	100	20	20	140	5
3.	MASTER OF COMP. APP.	CA40313(CA)	Formal Language & Automata Theory	4	1	0	100	20	20	140	5
4.	MASTER OF COMP. APP.	CA40314(CA)	Unix Operating System & Shell Programming	4	1	0	100	20	20	140	5
5.	MASTER OF COMP. APP.	CA40315(CA)	Object Oriented Analysis, Design & C++	4	1	0	100	20	20	140	5
6.	MASTER OF COMP. APP.	CA40321(CA)	Unix Lab	0	0	6	75	-	50	125	3
7.	MASTER OF COMP. APP.	CA40322(CA)	Programming Lab in C++	0	0	6	75	-	50	125	3
8.	HUMANITIES & SOCIAL SCIENCES	HS40323(CA)	Personality Development Lab	0	0	2	-	-	50	50	1
			Total	**20**	**5**	**14**	**650**	**100**	**250**	**1000**	**32**

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IIIrd Semester MCA   Code : CA40311(CA)

COMPUTER NETWORKS & COMMUNICATION

UNIT-1
Introduction: Layered Network Architecture, Review of ISO-OSI Model, Introduction to TCP/IP Model.; Data Communication Techniques; Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM).; Multiplexing Techniques; Frequency Division, Time Division, Statistical Time Division Multiplexing.; Physical Layer: Transmission Media: Wires, Cables, Radio Links, Satellite Link, Fiber Optic.; Error Detection and Correction: Single and Burst Error, parity Check Codes, Cyclic Redundancy Code & Hamming Code.

UNIT-2
Data Link Layer Protocols: Stop and Wait Protocols: Noise free and Noisy channels, performance and efficiency, Sliding Window Protocols: Go Back and Selective Repeat ARQS, performance and efficiency, verification of protocol., HDLC and ATM: HDLC data link protocol, ISDN, Channel Structure, Asynchronous Transfer Mode (ATM), ATM Cells, Header and Cell Format. Layers in ATM Class 1,2,3,4 traffic.

UNIT-3
Medium Access Control Sub layer: Concept of Random Access, Pure ALOHA throughput characteristics of ALOHA Throughputs for finite and infinite populations S-ALOHA., LAN: IEEE 802.3, 802.4 and 802.5 Protocols performance of Ethernet. Token Ring Protocol, FDDI Protocol, Distributed Queue Dual Bus (DQDB) Protocol.

UNIT-4
Network and Transport Layer Protocols: General Principles, Virtual circuits and datagram's, Windows flow control, Packet Discarding, Traffic Shaping, Choke RSVP, Network Layer in ATM, Internetworking using Bridge, Routers and Gateways, Routing Algorithms: Optimality principle, shortest path routing-Dijkstra, Flooding and broadcasting, distance vector routing, link state routing, flow based routing, Multicasting routing flow and congestion control. Internet Architecture and Addressing. Transport Layer: Design issues, Quality of Services, Primitives Connection Management: Addressing, Connection Establishment and Releases. Flow control and Buffering, Crash recovery, Element of TCP/ IP protocol: User Data gram Protocol, (UDP/TCP) Layering.

UNIT-5
Presentation And Application Layer Protocols: Presentation concepts SNMP Abstract Syntax notation. I (ASN-I), Cryptography: Substitutions and Transposition, Ciphers, Data Encryption Standard (DES), DES Chaining, Breaking DES, Public Key Cryptography, Authentication Protocols.

Text Books :

1. A. S. Tanenbaum "Computer Network: Second Ed. Prentice Hall, India (tan).
2. B. A. Frouzan, Data Communication, Tata Mc Graw Hill.

Reference:
1. D. Berekas an R. Gallager, "Data Networks:, second Ed. Prentice Hall, India.

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NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IIIrd Semester MCA   Code : MA40312(CA)

COMPUTER ORIENTED OPTIMIZATION

Unit – I: - Linear Programming Problem
Mathematical formulation of L.P.P., Graphical method for solving LPP with two variables, Simplex method, Application of simplex method for maximization & minimization of LPP, Artificial variable technique for finding the initial basic feasible solution, Two Phase method, The Big-M method, Degeneracy in simplex method, Duality theory in LP, Dual simplex method.

Unit - II: -Transportation, Assignment & Replacement Problems
Transportation: North-West Corner Rule, Lowest Cost Entry method, Vogel's Approximation method, Modi Method, Assignment problem. Replacement : Replacement of equipment/ Asset that Deteriorates Gradually, Replacement of equipment that fails suddenly, Recruitment & Promotion problem, Equipment renewal problem.

Unit – III: -Inventory Models
Introduction to the inventory problem, Deterministic models, The classical EOQ (Economic order quantity) model, Purchasing model with no shortage, Manufacturing model with no shortage, Purchasing model with shortage, Manufacturing model with shortage, Inventory models with probabilistic demand.

Unit – IV: -Sequencing & Queuing Theory
Sequencing problem, Johnson's algorithm for processing N-jobs through two-machine problem, N-jobs through 3 machine problem, 2- jobs through N-machine by graphical method, Characteristics of queuing system-steady state M/M/1, M/M/1K & M/M/C queuing models.

Unit - V: - Network Analysis
Introduction, Network & basic components, Logical sequencing, Rules of Network Construction, CPM/PERT Techniques, Critical path method (CPM),Determination of critical path (Labelling method), The Project Evaluation & Review Technique (PERT),Probability Considerations in PERT, Distinction between PERT & CPM, Project cost, Time-cost optimization algorithm.

TEXT BOOKS:
1. Operation Research – 2 ed, Panneerselvam , Prentice Hall of India.
2. Operation Research : An Introduction – 8rd, Hamdy a. Taha, Prentice Hall of India.

REFERENCE BOOKS:
1. Gillett B.E., Introduction to Operation Research- A Computer Oriented Algorithmic Approach, McGraw Hill.
2. Kanti Swarup, Gupta P.K., Man Mohan, Operations Research, Sultan Chand & Sons.
3. Vohra N.D., Quantitative Techniques in Managemental, T.M.H., 1990.
4. Zoints. S., Linear & Integer Programming, Prentice Hall, 1975.
5. R.K.Gupta, Operational Research, Krishna Prakashan, Mandir Meerut.

FORMAL LANGUAGE & AUTOMATA THEORY

UNIT-1
Review of mathematical preliminaries, Relations, Functions, Set Theory, Predicate and Prepositional Calculus, Principle of mathematical induction/strong mathematical induction.

UNIT-2
Formal Languages, Phrase structured grammar and their classification, Chomsky hierarchy, closure properties of families of languages, regular grammar, properties of regular sets, finite automata NFA, DFA & 2DFA, FSM with output Determinism and Non determinism, FA minimization and related theorems.

UNIT-3
Context free grammar and their properties, derivation tree, simplifying CFG, unambigufying CFG, CNF and GNF of CFG, push down automata, Two way PDA, relation of PDA with CFG, Determinism and Non determinism in PDA and related theorems.

UNIT-4

Concept of Linear Bounded Automata, Context sensitive grammar and their equivalence; unrestricted grammars and their equivalence with TM, determinism and non determinism in TM, TM as acceptor/generator/algorithms and related theorems, Multi tape, multi track TM, automata with two push down store and related theorems.

UNIT-5

Introduction to Complexity theory, Introduction to recursive function theory, Recursively enumerable sets, recursive sets, partial recursive sets, Russell's paradox, Church's hypothesis, post correspondence problem, undecidability and some non-computable problems.

Text Books :
1. Hopcropft and Ullman: Introduction to automata theory, Languages & Computation, Narosha Publication house.
2. Mishra & Chandrashekharan: Theory of Computer Science, Automata Lanauages & computation, 2nd Ed PHI, New Delhi.

Reference Books:
1. Lewish Papadimitra: theory of Computations, Prentice Hall of India, New Delhi.
2. Liu C.L.: Elements of Discrete Mathematics, Mc Graw Hill.
3. Hopcropt, Rajeev Motwani and Ullman: Introduction to Automata Theory, Languages and Computation.

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IIIrd Semester MCA   Code : CA40314(CA)

UNIX Operating System & Shell Programming

UNIT-1 Introduction: Introduction to multi-user system, history of UNIX, features & benefits, versions of UNIX, Unix file system, concept of inode table, links, commonly used commands like who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, sed, awk, tr, yacc etc. getting started (login/logout) Vi editor: Introduction to text processing, command& edit mode invoking vi, deleting & inserting line, deleting &replacing character, searching for strings, yanking, running shell command macros, set window, set auto indent, set no., introduction to exrc file.

UNIT-2 Introduction To Shell Scripts & Awk Programming: Bourne shell, C shell, shell variables, scripts, Meta characters and environment, if and case statements, for while and until loops., Awk pattern scanning and processing language, BEGIN and End patterns, AWK arithmetic and variable built in variable names and operators, arrays, strings.

UNIT-3 General Overview Of The System: System structure, user perspective, O/S Services assumption about Hardware, The kernel and buffer cache architecture of Unix O/S, System concepts, Buffer headers, Structure of the buffer pool, scenarios for retrieval of the buffer, Reading and writing disk Blocks, advantage and disadvantage of buffer cache.

UNIT-4 Internal Representation Of Files System Calls For The System: INODES, structure of regular Directories, conversions of a path name to an inode, super block, inode assignment to a new file, allocation of disk blocks. OPEN , READ WRITE, CLOSE , file and record locking, File creation, Operation of special files , change directory and change root, change owner and change mode, STAT and FSTAT, PIPES, Mounting and unmounting file system, Link , Unlink.

UNIT-5 Structures Of Processes And Process Control: Process states and transitions layout of system memory, the context of a process, manipulation of process address space, sleep process creation/termination,. The user ID of a process, changing the size of a process. The SHELL.

Text Books:
1.   Design of Unix O.S. , Maurice Bach, Prentice Hall of India.
2.   Unix Concepts and Applications, Sumitabha Das, Tata McGraw Hill

Reference Books:
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NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IIIrd Semester MCA   Code : CA40315(CA)

OBJECT ORIENTED ANALYSIS, DESIGN & C++

UNIT-1   C++ Basics :
Data Hiding, Encapsulation, Data Abstraction, loops and decisions, structures and functions, object and classes, Scope of class and its member, Nested Class, object arrays, Pointers, Construction: parameterized construction, multiple constructor, default constructor, copy constructor, implicit constructor, destructor function, dynamic allocation operators : new(), delete().

UNIT-2   Friend function, Friend class, Inline functions, Function overloading, Operator Overloading: Unary, Binary, Inheritance: Single inheritance, Multilevel inheritance, Hierarchical inheritance, Hybrid Inheritance, Multiple inheritance.

UNIT-3   Virtual base classes, pointers to base and derived classes, virtual functions, early and late binding, templates, exception handling.

UNIT-4   C++ I/O System, formatted I/O, creating insertors and extractors, file I/O basis, creating disk files working with file : files & streams, opening & closing a file, read() & write() functions, Detecting end-of-file. File manipulation using seekg(), tellg() functions.

UNIT-5   Object Model, OOD and OOA, abstraction, encapsulation, modularity, hierarchy, state, behaviour and relationship among objects. Objects oriented design, identifying classes and object, object diagrams.

Text Books :
1. K. R. Venugopal, Raj Kumar & T. Ravi Shankar : Mastering C++, TMH Pub.
2. H. Schildt : C++ complete reference, TMH Pub.

Reference Books:
1. Balaguruswami : Object Oriented Programming with C++
2. Robert Lafore : Object Oriented Programming in Turbo C++, Galgotia Pub.
3. Grady Booch : Object Oriented Analysis & Design, Pearson.
4. Stephen Prata: C++ Primer Plus, Galgotia Pub.
5. Bjarne Stroustrup : The C++ Programming Language, Pearson

UNIX LAB

1. Write shell script for the following
It should display menu for following
      Display file contents with line number
      display the file contents with page break
      quit.

2 Write a shell script for accepting the following information and storing in file.
i) customer name
ii) item description
iii) quantity
iv) rate
the user should get the facility to enter as many record as he wants.

3 Calculate factorial value of any number using awk command.

4 Write awk command to count the number of times each word occurs in a
sorted list containning one word per line.

5 Suppose we have table with following structure
item name no. of item sold,cost/item.write a shell script that will display
i) Total no. of item sold
ii) Total cost of individual item
iii) Total cost of all item

6 Write c shell shell script to check the no is prime or not

7 Find greatest among three no. using c-shell script

8. Write interactive shell script to copy the contents of one file to another

9. Display the output of ls-l command in user friendly way.

10 Write a shell script to search a word in list of file .two arguments will be used ,one will
contain words
to searched and another will contain name of files.

11 Write menu driven shell script to execute 5 basic command of unix

12 Write shell script to check whether the string is having vowel
i) 'unix' or 'UNIX'
ii) Count the length of string

13 Write shell script to perform following for each file of current directory
iii) delete a file if its extension is .old
iv) copy a file it its extension is .c
v) move a file it its extension is .Cobol
vi) display the contents of file if it has read permission

14 Delete one of one file if two file are similar, if not display proper message. write shell

Script using
command line argument ,without command line argument.
15 Write shell script to generate multiple answer type question.

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IIIrd Semester MCA   Code : CA40322(CA)

PROGRAMMING LAB IN C++

(1)   Write a program to define a class book that will contain Title, Author and Price of the book as data members. Define Null Constructor, parameterized constructor and copy constructor for the class and a function to display the details of an object. Use the new operator to initialize object of this class through a pointer and display the data member through a member function.

(2)   Write a program to define two classes Alpha and Beta containing an integer each as data members. Define a function Sum() that will be a friend to both Alpha and Beta, That will take one object from each class as argument and return the sum of the data members of the argument objects.

(3)   Write a program to define a class Sample containing a static data member count that will maintain the total number of objects of this class initialized so far.

(4)   Write a program to define a class Complex that will contain real and imaginary as the data members. Define appropriate constructors and a display functions. Overload the binary + and the * operator to add and multiply two complex numbers respectively.

(5)   Write a program to define a class time that will represent a time period in minutes and seconds. Define member functions and overload the following operators for the following:
   •   ++ Operator that will increment the seconds by 1
   •   + Operator that will and two objects of time class

(6)   Write a program to define a class Array that will contain an array of integers as a private data member of the class. Overload the subscript operator [] so that it will take an integer index as an argument and return the reference of element at that index in the array.

(7)   Write a program to overload the comma operator for a class such that for the instruction a = (b, c) the larger object of 'c' and 'b' is assigned to 'a'.

(8)   Write a program to define a class Base that will contain a protected integer data member and inherit this class in class called Derived. Override the display function of Base class and add a new member function in the Derived class so that it returns the factorial of the Base class member.

(9)   Write a program to define a class Two dimensional that will represent a point in the plane by its x and y coordinates. The class will contain constructors and member function that can calculate the distance between any two points in the plane. Derive a new class Three dimensional from the class Two dimensional that will add a new member, the z coordinate. Override the function that calculates distance so that kit can calculate the distance between two points in the space.

(10)   Write a program to define an abstract class person that will contain the essential information like name, age and sex of a person. Now derive two classes student and Employee both from the class person. The class Student will contain the academic information such as roll number; school etc. and the class Employee will contain information such as department and salary. In the main function declare and array of Person pointers that can hold the address of either Student or Employee object. The program will ask the user to enter the details of students/ Employees, create dynamic objects of these classes using new operator and store them in the array. The program will then display the contents of these objects.

(11)   Write a program to read the contents of a text file and count the number of characters read from the file.

(12)   Write a program that will ask the user to input a file name and copy the contents of that file into another file

(13)   Write a program that will ask the user to enter the details of 5 students and transfer those details into a binary file Stud.dat. Write another file that will read the details of the students and print the names of all those students who have total marks greater that a particular given value.

(14)   Write a program that will take the details of 10 students as input and transfer it into a binary file Write a another program that will be provide a menu to the user for the following purposes:
   •   To display details of all the students
   •   To display details of all the students having total marks greater than a given value
   •   To sort the file on the basis of Roll number of students
   •   To sort the file on the basis of Total marks of students
   •   To update the record for a particular student
   •   To delete the record for a particular student
   •   To search the details of a particular student on the basis of Roll Number or Name

(15)   Write a program that will take any number of integers from the command line as argument and print the sum of all those integers.

List of Equipments / machine Required :
(i)   PC with Windows XP
(ii)   Turbo C++ Compiler

Recommended Books:
1. K. R. Venugopal, Raj Kumar & T. Ravi Shankar : Mastering C++, TMH Pub.
2. H. Schildt : C++ complete reference, TMH Pub.

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR (C.G.)
Semester - IIIrd Semester MCA   Code : HS40323(CA)

PERSONALITY DEVELOPLMENT

UNIT-1   **Personality Concepts :**
- What is Personality – its physical and psychic aspects? How to develop a positive self-image. How to aim at excellence. How to apply the conmic laws that govern life and personality.
- How to improve memory. How to develop successful learning skills. How to develop and effectively use one's creative power.
- How to apply the individual MOTIVATORS that make you a self-power personality.

UNIT-2   **Interpersonal Skills :**
- **Leadership** : Leaders who make a difference, Leadership: your idea, What do we know about leadership? If you are sericous about Excellence. Concepts of leadership, Two important keys to effective leadership, Principles of leadership, Factors of leadership, Attributes.
- **Listening:** Listening skills, How to listen, Saying a lot-just by listening, The words and the music, How to talk to a disturbed person, Listening and sometimes challenging.
- **How to win friends** and influence people, How to get along with others. How to develop art of convincing others. How can one make the difference? How to deal with others particularly elders. Conflicts and cooperation.

UNIT-3   **Attitudinal Changes**:
- **Meaning of attitude**, benefits of positive attitudes, how to develop the habit of positive thinking.
- **Negative attitude and wining**: What is FEAR and how to win it. How to win loneliness. How to win over FAILURE. How to win over PAIN. How to win over one's ANGER and others anger. How to overcome CRITICISM. What is stress and how to cope up with it? What is crisis and how to manage it?
- How to apply the **character MOTIVATORS** that elevate you and your personality to the top, the art of self motivation.
- How to acquire **mental well-being**.
- How to acquire **physical well-being**.
- How to formulate effective **success philosophy**.

UNIT-4   **Decision Making :**
How to make your own LUCK. How to plan goals/objectives and action plan to achieve them. How to make RIGHT DECISION and overcome problems. How to make a Decision. Decision making : A question of style. Which style, when? People decision: The key decisions. What do we know about grout decision making? General aids towards improving group decision making. More tips for decisions of importance.

UNIT-5   **Communication Skills**:
- **Public Speaking**: Importance of Public speaking for professionals. The art of Speaking – Forget the fear of presentation, Symptoms of stage fear, Main reason for speech failure, Stop failures by acquiring Information; Preparation & designing of speech, Skills to impress in public speaking & Conversation, Use of presentation aids & media.
- **Study & Examination**: How to tackle examination, How to develop successful study skills.
- **Group discussions**: Purpose of GD, What factors contribute to group worthiness, Roles to be played in GD.

Reference Books:

1. How to develop a pleasing personality by Atul John Rego, Better yourself books, Mumbai, 2000.
2. How to succeed by Brain Adams, Better Yourself Books, Mumbai, 1969.
3. Basic Managerial Skills for all by E. H. McGrawth, Prentice Hall India Pvt. Ltd, 2006.
4. The powerful personality by Dr. Ujjawala Patni & Dr. Pratap Deshmukh, Medident Publisher. 2006.
5. Great Words win Heart by Dr. Ujjwal Patni, Fusion Books, 2006.
6. Personality : Cassic Theories & Modern Research; Friedman; Pearson Education 2006.
7. How to win friends and influence people by Dale Carnigie, A.H.Wheeler 2006.