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**MODIFIED CBCS CURRICULUM OF  
BACHELOR OF COMPUTER APPLICATION (BCA)  
HONOURS PROGRAMME**

**SUBJECT CODE = 58**

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FOR UNDER GRADUATE COURSES UNDER RANCHI UNIVERSITY



Implemented from  
Academic Session 2018-2021



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## COURSE STRUCTURE FOR UNDERGRADUATE 'HONOURS' PROGRAMME

**Table AI-1: Distribution of 140 Credits** [\*wherever there is a practical there will be no tutorial and vice-versa.]

Course	Papers	Credits	
		Theory + Practical	Theory + Tutorial
<b>I. Core Course</b>	<b>(CC 1 to 14)</b>		
Theory	14 Papers	14X4=56	14X5=70
Practical/Tutorial*	14 Papers	14X2=28	14X1=14
<b>II. Elective Course (EC)</b>			
A. Discipline Specific Elective	<b>(DSE 1 to 4)</b>		
Theory	4 Papers	4X4=16	4X5=20
Practical/ Tutorial*	4 Papers	4X2=8	4X1=4
B. Generic Elective/ Interdisciplinary	<b>(GE 1 to 4)</b>		
Theory	4 Papers	4X4=16	4X5=20
Practical/ Tutorial*	4 papers	4X2=8	4X1=4
<b>III. Ability Enhancement Compulsory Courses (AECC)</b>			
1. English/ Hindi Communication	1 Paper	1X2=2	1X2=2
2. Environmental Science	1 Paper	1x2=2	1x2=2
3. Skill Enhancement Course of the Core Course opted	<b>(SEC 1 &amp; 2)</b> 2 Papers	2X2=4	2X2=4
<b>Total Credit = 140</b>			<b>= 140</b>

**Table AI-1.1: Course structure for B.Sc./ B.A./ B.Com./B.Voc. (Hons. Programme)**

Semester	Honours (Core Courses) 14 Papers	Allied (Elective Courses) 8 Papers	Ability Enhancement (Compulsory Courses) 4 Papers	Total Credits
Sem-I	C-1, C-2 (6+6=12 Credits)	GE-1 (06 Credits)	English Comm./ Hindi Comm. (02 Credits)	<b>20 Credits</b>
Sem-II	C-3, C-4 (6+6=12 Credits)	GE-2 (06 Credits)	EVS (02 Credits)	<b>20 Credits</b>
Sem-III	C-5, C-6, C-7 (6+6+6=18 Credits)	GE-3 (06 Credits)	SEC-1 (02 Credits)	<b>26 Credits</b>
Sem-IV	C-8, C-9, C-10 (6+6+6=18 Credits)	GE-4 (06 Credits)	SEC-2 (02 Credits)	<b>26 Credits</b>
Sem-V	C-11, C-12 (6+6=12 Credits)	DSE-1, DSE-2 (6+6=12 Credits)		<b>24 Credits</b>
Sem-VI	C-13, C-14 (6+6=12 Credits)	DSE-3, DSE-4 (6+6=12 Credits)		<b>24Credits</b>

**Total = 140 Credits**

## COURSES OF STUDY FOR UNDERGRADUATE 'B.C.A. Hons' PROGRAMME

**Table AI-2 Subject Combinations allowed for B.C.A. Hons. Programme (140 Credits)**

Honours/Core Subject CC 14 Papers	Discipline Specific Elective Subject DSES 4 Papers	Skill Enhancement Course SEC 2 Papers	Compulsory Course AECC 1+1=2 Papers
BCA	BCA Specific	SEC in BCA	Language Communication + EVS

**Table AI-2.1 Semester wise Examination Structure for Mid Sem & End Sem Examinations:**

Sem	Core Honours, Allied DSE, Compulsory AECC Courses		Examination Structure		
	Code	Papers	Mid Semester Theory (F.M.)	End Semester Theory (F.M.)	End Semester Practical/ Viva (F.M.)
I	C1	Programming Fundamental using C/C++ +Lab	15	60	50
	C2	Computer System Architecture +Lab	15	60	
	GE1	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100	---
	AECC	Language Communication		100	
II	C3	Programming in JAVA +Lab	15	60	25
	C4	Discrete Structures. + Tutorial	25	75	---
	GE2	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100	---
	AECC	EVS	---	100	---
III	C5	Data Structures with C +Lab	15	60	75
	C6	Operating Systems. +Lab	15	60	
	C7	Computer Networks +Lab	15	60	
	GE3	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100	---
	SEC 1	HTML Programming+ Lab	---	75	25
IV	C8	Design and Analysis of Algorithms +Lab	15	60	75
	C9	Software Engineering Theory +Lab	15	60	
	C10	Database Management Systems +Lab	15	60	
	GE4	Refer Table AI-2.3 of the Syllabus of Subject opted	---	100	---
	SEC 2	PHP Programming+ Lab	---	75	25
V	C11	Internet Technologies +Lab	15	60	25
	C12	Theory of Computation + Tutorial	25	75	---
	DSE 1	Information Security +Lab	15	60	50
	DSE 2	Cloud computing +Lab	15	60	
VI	C13	Artificial Intelligence +Lab	15	60	50
	C14	Computer Graphics with Flash +Lab	15	60	
	DSE 3	Numerical Method+ Lab	15	60	25
	DSE 4	OJT & Project Work/ Dissertation	---	---	50 + 50

**SEMESTER I****4 Papers****Total 100 x 4 = 400 Marks****I. ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)**

(Credits: Theory-02)

**योग्यता संवर्धन अनिवार्य पाठ्यक्रम :**

(क्रेडिट: सैद्धान्तिक -02)

**ENGLISH COMMUNICATION****Theory: 30 Lectures****Marks : 100 (ESE 3Hrs) =100****Pass Marks Th ESE = 40*****Instruction to Question Setter for  
End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain three questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 & 3 will be short answer type of 5 marks. Group B will contain descriptive type six questions of 20 marks each, out of which any four are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**OBJECTIVE:** To equip students effectively to acquire skills in reading, writing, comprehension and communication, as also to use electronic media for English Communication.

**Unit I:** Communication – Definition, stages, barriers, types: verbal and non-verbal, Listening- Meaning, Nature and importance, Principles of Good Listening.

**Unit II:** Class-presentation (Oral for five minutes) on any of the above-mentioned topics:  
Descriptive writing, expansion of an idea.

**Unit III:** Writing skills –, notice writing, advertisement writing, précis writing, essay writing, letter writing (applications), Business letter formats (letters of enquiry, replies and complaints), resume writing, covering letter

**Unit IV:** Vocabulary building: One word substitution, synonyms and antonyms, idioms and phrases

**Suggested Reading:**

- Technical Communication*, M.H. Rizvi, Tata McGrawhill
- Effective Business Communication*, Asha Kaul
- Developing Communication Skills*, Krishnamohan
- Functional Grammar and Spoken and Written Communication in English*, Bikram K. Das, Orient Blackswan
- Precis, Paraphrase and Summary*, P.N. Gopalkrishnan, Authors Press
- Communication Skills*, Sanjay Kumar and Pushplata, Oxford Publication

**Note: Latest edition of text books may be used.**

OR

**HINDI COMMUNICATION****Theory: 30 Lectures****Marks : 100 (ESE 3Hrs) =100****Pass Marks Th ESE = 40****प्रश्न पत्र के लिए निर्देश**छमाही परीक्षा :

प्रश्नों के दो समूह होंगे। खण्ड 'A' अनिवार्य है जिसमें तीन प्रश्न होंगे। प्रश्न संख्या 1 में दस अत्यंत लघु उत्तरीय 1 अंक के प्रश्न होंगे। प्रश्न संख्या 2 व 3 लघु उत्तरीय 5 अंक का प्रश्न होगा। खण्ड 'B' में छः में से किन्हीं चार 20 अंको के विषयनिष्ठ/वर्णनात्मक प्रश्नों के उत्तर देने होंगे।

नोट : थ्योरी परीक्षा में पूछे गए प्रत्येक प्रश्न में उप-विभाजन हो सकते हैं।

**हिन्दी व्याकरण एवं संप्रेषण****सैद्धान्तिक: 30 व्याख्यान**

**इकाई—1** हिन्दी व्याकरण और रचना,  
संज्ञा, सर्वनाम, विशेषण, क्रिया, अव्यय, कारक, वचन, संधि, उपसर्ग, प्रत्यय तथा समास,  
लिंग निर्णय, पर्यायवाची शब्द, विलोम शब्द, अनेक शब्दों के लिए एक शब्द,  
शब्द शुद्धि, वाक्य शुद्धि, मुहावरे और लोकोक्तियाँ, पल्लवन एवं संक्षेपण।

**इकाई —2** निबंध कला तथा समसामयिक एवं राष्ट्रीय विषयों पर निबंध लेखन

**इकाई —3** संप्रेषण (संचार)  
—संप्रेषण की अवधारण और महत्व, संप्रेषण के लिए आवश्यक शर्तें, संप्रेषण के प्रकार,  
संप्रेषण का माध्यम, संप्रेषण कला, संप्रेषण की तकनीक, वाचन कला, समाचार वाचन,  
साक्षात्कार कला, रचनात्मक लेखन का लक्ष्य, रचनात्मक लेखन का आधार, भाव और  
विचारों की प्रस्तुति, वाक् कला की उपयोगिता।

**अनुशासित पुस्तकें :-**

- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| □ वृहत व्याकरण भास्कर               | : डॉ० वचनदेव कुमार                |
| □ वृहत निबंध भास्कर                 | : डॉ० वचनदेव कुमार                |
| □ आधुनिक हिन्दी व्याकरण और रचना     | : डॉ० वासुदेव नन्दन प्रसाद        |
| □ रचना मानस                         | : प्रो० रामेश्वर नाथ तिवारी       |
| □ व्यवहारिक हिन्दी                  | : डॉ० जंग बहादुर पाण्डेय          |
| □ रचनात्मक लेखन                     | : डॉ० रमेश गौतम                   |
| □ राजहंस हिन्दी निबंध               | : प्रो० आर० एन० गौड़              |
| □ सफल हिन्दी निबंध                  | : रत्नेश्वर                       |
| □ निबंध सहचर                        | : डॉ० लक्ष्मण प्रसाद              |
| □ उपकार मुहावरे और लोकोक्तियाँ      | : प्रो० राजेश्वर प्रसाद चतुर्वेदी |
| □ कहानियों कहावतों की               | : प्रताप अनम                      |
| □ सम्प्रेषणपरक हिन्दी भाषा शिक्षण   | : डॉ० वैशना नारंग                 |
| □ शैली विज्ञान                      | : डॉ० सुरेश कुमार                 |
| □ शैली विज्ञान प्रतिमान और विश्लेषण | : डॉ० पांडेय शशिभूषण 'शीतांशु'    |
| □ शैली विज्ञान का इतिहास            | : डॉ० पांडेय शशिभूषण 'शीतांशु'    |

**I. GENERIC ELECTIVE (GE 1):****(Credits: 06)**

All Four Papers (One paper to be studied in each semester) of any One Subject to be opted other than the Honours Subject. Refer Content from the Syllabus of Opted Generic Elective Subject.



**II. CORE COURSE –C 1:**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for******Mid Semester Examination (MSE):***

There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.

***End Semester Examination (ESE):***

There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.

**Note:** There may be subdivisions in each question asked in Theory Examinations.

**PROGRAMMING FUNDAMENTALS USING C/C++****Theory: 60 Lectures****1. Introduction to C and C++****(3 Lectures)**

History of C and C++, Overview of Procedural Programming and Object-Oriented Programming, Using main() function, Compiling and Executing Simple Programs in C++.

**2. Data Types, Variables, Constants, Operators and Basic I/O****(5 Lectures)**

Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putcharc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc).

**3. Expressions, Conditional Statements and Iterative Statements****(5 Lectures)**

Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

**4. Functions and Arrays****(10 Lectures)**

Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

Creating and Using One Dimensional Arrays ( Declaring and Defining 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 / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

**5. Derived Data Types (Structures and Unions)****(3 Lectures)**

Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

**6. Pointers and References in C++****(7 Lectures)**

Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems with Pointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References, Declaring and initializing references, Using references as function arguments and function return values

**7. Memory Allocation in C++****(3 Lectures)**

Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation

**8. File I/O, Preprocessor Directives****(4 Lectures)**

Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

**9. Using Classes in C++****(7 Lectures)**

Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables & Functions, Objects as parameters, Specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use.

**10. Overview of Function Overloading and Operator Overloading****(5 Lectures)**

Need of Overloading functions and operators, Overloading functions by number and type of arguments, Looking at an operator as a function call, Overloading Operators (including assignment operators, unary operators)

**11. Inheritance, Polymorphism and Exception Handling****(8 Lectures)**

Introduction to Inheritance (Multi-Level Inheritance, Multiple Inheritance), Polymorphism (Virtual Functions, Pure Virtual Functions), Basics Exceptional Handling (using catch and throw, multiple catch statements), Catching all exceptions, Restricting exceptions, Rethrowing exceptions.

**Reference Books:**

- Herbtz Schildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
- Bjarne Stroustrup, "The C++ Programming Language", 4<sup>th</sup> Edition, Addison-Wesley, 2013.
- Bjarne Stroustrup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
- E Balaguruswamy, "Object Oriented Programming with C++"

Marks : Pr (ESE: 3Hrs)=50

Pass Marks: Pr (ESE) = 20

***Instruction to Question Setter for******Practical Examination (ESE)***

There will be **two** group of questions in Practical Examination of 3Hrs.. **Group A** having questions from **CORE PAPER 1(CCI)** will contain **four** questions, out of which any two are to be answered **Group B** having questions from **CORE PAPER 2(CC2)** will contain **two** questions, out of which any one is to be answered.

**Lab:** Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

**Assignment:** The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.

***Marks Distribution:***

LAB(Experiment + Answer script)	= 30 marks
Assignment	= 10 marks
Viva-voce	= 10 marks

**SECTION-I**

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.
3. WAP to compute the sum of the first n terms of the following series  $S = 1+1/2+1/3+1/4+.....$
4. WAP to compute the sum of the first n terms of the following series  $S = 1-2+3-4+5.....$
5. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
6. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
7. WAP to compute the factors of a given number.
8. Write a macro that swaps two numbers. WAP to use it.
9. WAP to print a triangle of stars as follows (take number of lines from user):

```

      *
     ***
    *****
   ********
  *********
 
```

10. WAP to perform following actions on an array entered by the user:
  - i. Print the even-valued elements
  - ii. Print the odd-valued elements
  - iii. Calculate and print the sum and average of the elements of array
  - iv. Print the maximum and minimum element of array
  - v. Remove the duplicates from the array
  - vi. Print the array in reverse order

**SECTION-II**

1. WAP to perform following actions on an array entered by the user:
    - a. Print the even-valued elements
    - b. Print the odd-valued elements
    - c. Calculate and print the sum and average of the elements of array
    - d. Print the maximum and minimum element of array
    - e. Remove the duplicates from the array
    - f. Print the array in reverse order
  2. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
  3. Write a program that swaps two numbers using pointers.
  4. Write a program in which a function is passed address of two variables and then alter its contents.
  5. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
  6. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.
  7. Write a menu driven program to perform following operations on strings:
  8. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
  9. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
  10. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
  11. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
-

**III. CORE COURSE- C 2:**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for******Mid Semester Examination (MSE):***

There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.

***End Semester Examination (ESE):***

There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.

**Note:** There may be subdivisions in each question asked in Theory Examinations.

**COMPUTER SYSTEM ARCHITECTURE****Theory: 60 Lectures****1. Introduction****(8 lectures)**

Logic gates, boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

**2. Data Representation and Basic Computer Arithmetic****(10 lectures)**

Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers

**3. Basic Computer Organization and Design****(13 lectures)**

Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input -output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

**4. Central Processing Unit****(15 lectures)**

Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures, pipelining and parallel architecture.

**5. Memory Organization****(6 lectures)**

Cache memory, Associative memory, mapping.

**6. Input-Output Organization****(8 lectures)**

Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

**Reference Books:**

- M. Mano, Computer System Architecture, Pearson Education 1992
- A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004
- W. Stallings, Computer Organization and Architecture Designing for Performance, 8 Edition, Prentice Hall of India, 2009
- M.M. Mano , Digital Design, Pearson Education Asia, 2013
- B Ram , Computer Organization, Eighth edition,

**PRACTICAL-C 2 LAB****60 Lectures**

1. Introduction to Assembly language programming.
  2. Introduction to various types of registers used in programming.
  3. Introduction to various Assemblers used in assembling the Assembly language programs.
  4. Write a program to print “Hello World” in Assembly Language.
  5. Write a program in Assembly Language to show the sum of two numbers.
  6. Write a program in Assembly Language to concatenation of two strings.
  7. Write a program in Assembly Language to find the reverse of a string.
  8. Write a program in Assembly Language to store five numbers in array and display it.
-

**SEMESTER II****4 Papers****Total 100 x 4 = 400 Marks****II. ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)**

(Credits: Theory-02)

**Marks : 100 (ESE: 3Hrs) =100****Pass Marks Th ESE = 40*****Instruction to Question Setter for******End Semester Examination (ESE):***

*There will be **objective type test** consisting of hundred questions of 1 mark each. Examinees are required to mark their answer on **OMR Sheet** provided by the University.*

**AECC – ENVIRONMENT STUDIES****Theory: 30 Lectures****Unit 1 : Introduction to environmental studies**

Multidisciplinary nature of environmental studies;  
Scope and importance; Concept of sustainability and sustainable development.

**(2 lectures)****Unit 2 : Ecosystems**

What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems :

Forest ecosystem

Grassland ecosystem

Desert ecosystem

Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**(2 lectures)****Unit 3 : Natural Resources : Renewable and Non--renewable Resources**

Land resources and land use change; Land degradation, soil erosion and desertification.

Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.

Water : Use and over--exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter--state).

Energy resources : Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

**(5 lectures)****Unit 4 : Biodiversity and Conservation**

Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots

India as a mega--biodiversity nation; Endangered and endemic species of India

Threats to biodiversity : Habitat loss, poaching of wildlife, man--wildlife conflicts, biological invasions; Conservation of biodiversity : In--situ and Ex--situ conservation of biodiversity.

Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

**(5 lectures)**

### **Unit 5 : Environmental Pollution**

Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution

Nuclear hazards and human health risks

Solid waste management : Control measures of urban and industrial waste.

Pollution case studies.

**(5 lectures)**

### **Unit 6 : Environmental Policies & Practices**

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture

Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).

Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

**(4 lectures)**

### **Unit 7 : Human Communities and the Environment**

Human population growth: Impacts on environment, human health and welfare.

Resettlement and rehabilitation of project affected persons; case studies.

Disaster management : floods, earthquake, cyclones and landslides.

Environmental movements : Chipko, Silent valley, Bishnois of Rajasthan.

Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.

Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

**(3 lectures)**

### **Unit 8 : Field work**

Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.

Visit to a local polluted site--Urban/Rural/Industrial/Agricultural.

Study of common plants, insects, birds and basic principles of identification.

Study of simple ecosystems--pond, river, Delhi Ridge, etc.

**(Equal to 4 lectures)**



**Suggested Readings:**

- Raziuddin, M., Mishra P.K. 2014, *A Handbook of Environmental Studies*, Akanaksha Publications, Ranchi.
- Mukherjee, B. 2011: *Fundamentals of Environmental Biology*. Silverline Publications, Allahabad.
- Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
- Gadgil, M., & Guha, R. 1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
- Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
- Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
- Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
- Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science*, 339: 36---37.
- McCully, P. 1996. *Rivers no more: the environmental effects of dams*(pp. 29---64). Zed Books.
- McNeill, John R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century*.
- Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
- Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. *Environmental and Pollution Science*. Academic Press.
- Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
- Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. *Environment*. 8th edition. John Wiley & Sons.
- Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*. Tripathi 1992.
- Sengupta, R. 2003. *Ecology and economics: An approach to sustainable development*. OUP.
- Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
- Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology: Voices from the Tropics*. John Wiley & Sons.
- Thapar, V. 1998. *Land of the Tiger: A Natural History of the Indian Subcontinent*.
- Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
- Wilson, E. O. 2006. *The Creation: An appeal to save life on earth*. New York: Norton.
- World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University

**III. GENERIC ELECTIVE (GE 2):**

(Credits: 06)

All Four Papers (One paper to be studied in each semester) of any One Subject to be opted other than the Honours Subject. Refer Content from the Syllabus of Opted Generic Elective Subject.

**IV. CORE COURSE -C 3:**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for******Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type three questions of five marks each, out of which any two are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**PROGRAMMING IN JAVA****Theory: 60 Lectures****1. Introduction to Java****(4 Lectures)**

Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods),

**2. Arrays, Strings and I/O****(8 Lectures)**

Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.

**3. Object-Oriented Programming Overview****(4 Lectures)**

Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

**4. Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata (14 lectures)**

Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

**5. Exception Handling, Threading, Networking and Database Connectivity (15 Lectures)**

Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

**6. Applets and Event Handling****(15 Lectures)**

Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics,

Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets.

**Reference Books:**

- Black book ,java
- E. Balaguruswamy, "Programming with Java"

**COMPUTER PRACTICAL- C 3 LAB****60 Lectures****Marks : Pr (ESE: 3Hrs)=25****Pass Marks: Pr (ESE) = 10*****Instruction to Question Setter for******Practical Examination (ESE)***

There will be **four** questions in Practical Examination of 3Hrs. from **CORE PAPER 3(CC3)** out of which any two are to be answered.

**Lab:** Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

**Assignment:** The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.

**Marks Distribution:**

LAB(Experiment + Answer script)	= 15 marks
Assignment	=05 marks
Viva-voce	=05 marks

**SECTION-I**

1. To find the sum of any number of integers entered as command line arguments
2. To find the factorial of a given number
3. To learn use of single dimensional array by defining the array dynamically.
4. To learn use of length in case of a two dimensional array
5. To convert a decimal to binary number
6. To check if a number is prime or not, by taking the number as input from the keyboard
7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument
8. Write a program that show working of different functions of String and String Buffer classs like set Char At(), set Length(), append(), insert(), concat()and equals().
9. Write a program to create a —distancell class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer
10. Modify the —distancell class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another

object reference variable. Further create a third object which is a clone of the first object.

11. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions(from lower to higher data type)
12. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword
13. Write a program to show the use of static functions and to pass variable length arguments in a function.
14. Write a program to demonstrate the concept of boxing and unboxing.

## SECTION-II

1. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions(from lower to higher data type)
  2. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword
  3. Write a program to show the use of static functions and to pass variable length arguments in a function.
  4. Write a program to demonstrate the concept of boxing and unboxing.
  5. Create a multi-file program where in one file a string message is taken as input from the user
    - a. And the function to display the message on the screen is given in another file (make use of Scanner package in this program).
  6. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate fibonacci series is given in a different file belonging to the same package.
  7. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages
  8. Write a program —Divide By Zero that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
  9. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.
  10. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).
-

**III. CORE COURSE -C 4:**

(Credits: Theory-05, Tutorial-01)

**Marks : 25 (MSE: 1Hr) + 75 (ESE: 3Hrs)=100****Pass Marks (MSE + ESE) =40*****Instruction to Question Setter for  
Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type six questions of five marks each, out of which any four are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**DISCRETE STRUCTURES THEORY:****60 Lectures****1. Introduction:****(15 Lectures)**

Introduction sets ,operations on sets ,basic operations , prpperties common to logic and sets , Relations and cartesian product, relations and their types , property of relations ,Functions ,operations on functions

**2. Growth of Functions:****(8 Lectures)**

Asymptotic Notations, Summation formulas and properties, Bounding Summations, approximation by Integrals

**3. Recurrences:****(10 Lectures)**

Recurrence Relations, generating functions, Linear Recurrence Relations with constant coefficients and their solution, Substitution Method, Recurrence Trees, Master Theorem

**4. Graph Theory:****(15 Lectures)**

Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representaion, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees

**5. Propositional Logic:****(12 Lectures)**

Logical Connectives, Well-formed Formulas, Tautologies, Equivalences

**Reference Books:**

- C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985,
- Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition ,McGraw Hill 2006
- T.H. Cormen, C.E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd edition Prentice Hall on India, 2009
- M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988

**SEMESTER III****5 Papers****Total 100 x 5 = 500 Marks****I. SKILL ENHANCEMENT COURSE SEC 1:**

(Credits: Theory-02)

Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100

Pass Marks: Th (ESE) = 30 + Pr ESE =10

*Instruction to Question Setter for**End Semester Examination (ESE):*

There will be two group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**HTML PROGRAMMING****Theory: 15 Lectures****Unit-I: Introduction**

(1L)

**Unit-II: The Basics**

(2L)

- The Head, the Body
- Colors, Attributes
- Lists, ordered and unordered

**Unit-III: Links**

(3L)

- Introduction
- Relative Links, Absolute Links
- Link Attributes
- Using the ID Attribute to Link Within a Document

**Unit-IV: Images**

(2L)

- Putting an Image on a Page
- Using Images as Links
- Putting an Image in the Background

**Unit V: – Tables**

(4L)

- Creating a Table
- Table Headers o Captions
- Spanning Multiple Columns
- Styling Table

**Unit VI – Forms**

(3L)

- Basic Input and Attributes
- Other Kinds of Inputs
- Styling forms with CSS
- Where To Go From Here

**Reference Books**

- Virginia DeBolt , Integrated HTML and CSS A Smarter, Faster Way to Learn Wiley / Sybex , 2006
- Cassidy Williams, Camryn Williams Introduction to HTML and CSS, O'Reilly, 2015

Marks : Pr (ESE: 3Hrs)=25

Pass Marks: Pr (ESE) = 10

***Instruction to Question Setter for  
Practical Examination (ESE)***

There will be **four** questions in Practical Examination of 3Hrs. from **SKILL ENHANCEMENT PAPER 1 (SEC1)** out of which any two are to be answered.

**Lab:** Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

**Assignment:** The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.

**Marks Distribution:**

LAB(Experiment + Answer script) = 15 marks  
 Assignment = 05 marks  
 Viva-voce = 05 marks

**SOFTWARE LAB BASED ON HTML:**

Q1. Create an HTML document with the following formatting options:

- I. Bold
- II. Italics
- III. Underline
- IV. Headings (Using H1 to H6 heading styles)
- V. Font (Type, Size and Color)
- VI. Background (Colored background/Image in background)
- VII. Paragraph
- VIII. Line Break
- IX. Horizontal Rule
- X. Pre tag

Q2. Create an HTML document which implements Internal linking as well as External linking.


Q3. Create a table using HTML which consists of columns for Roll No., Student's name and grade.

Result		
Roll No.	Name	Grade

Q4. Create a Table with the following view:


Q5. Create an HTML document which consists of:

- I. Ordered List
- II. Unordered List
- III. Nested List
- IV. Image



## XYZ Ltd's Update

1. Introduction
2. Company Financial Update
  - o First Quarter
  - o Second Quarter
  - o Third Quarter
  - o Fourth Quarter
3. Advertising Update
  - o Result of Newspaper Campaign
  - o Additions to staff
  - o New Thoughts on Television
4. Human Resources Update

- A. Safety Considerations
  1. Body substance isolation
  2. Sense safty
  3. Initial size-up
- B. Intitial Patient Assessment
  1. General Impression
  2. Unresponsiveness
    - i. Alert to person, place and time
    - ii. Verbal response to audible stimuli
    - iii. Pain evokes verbal or physical response
    - iv. Unresponsive to all stimuli
- C. Patient Critical Needs
  1. Airway
  2. Breathing
    - i. Use oxygen if indicated
    - ii. Consider use of assisting with bag value mask
  3. Circulation
  4. Bleeding



Q. 6. Create a form using HTML which has the following types of controls:

- I. Text Box
- II. Option/radio buttons
- III. Check boxes
- IV. Reset and Submit buttons

### Subscribe to XYZ News Magazine and Emails

Interested in receiving daily small updates of all latest News? Well, now you can. And best of all, it is free! Just fill out this form and submit it by clicking the "send it In" button. We will put you on our mailing list and you will receive your first email in 3-5 days.

---

Please fill the following boxes to help us send the emails and our news letter:

First Name:

Last Name:

Business:

We must have a correct e-mail address to send you the news letter:

Email:

How did you hear about XYZ News Magazine and Emails?

Here on the Web
  In a magazine
  Television
  Other

Would you like to be on our regular mailing list?

Yes, we love junk emails

---

Q.7 Create HTML documents (having multiple frames) in the following formats:

FRAME 1
FRAME 2

FRAME 1	
FRAME 2	FRAME 3

**II. GENERIC ELECTIVE (GE 2):**

(Credits: 06)

All Four Papers (One paper to be studied in each semester) of any One Subject to be opted other than the Honours Subject. Refer Content from the Syllabus of Opted Generic Elective Subject.

**III. CORE COURSE -C 5:**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for  
Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type three questions of five marks each, out of which any two are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**DATA STRUCTURES****Theory: 60 Lectures****Arrays****(5 Lectures)**

Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked Representation)

**Stacks****(5 Lectures)**

Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack

**Linked Lists****(10 Lectures)**

Singly, Doubly and Circular Lists (Array and Linked representation); Normal and Circular representation of Stack in Lists; Self Organizing Lists; Skip Lists

**Queues****(5 Lectures)**

Array and Linked representation of Queue, De-queue, Priority Queues

**Recursion****(5 lectures)**

Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack)

**Trees****(20 Lectures)**

Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion, Recursive and Iterative Traversals on Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals); Height-Balanced Trees (Various operations on AVL Trees).

**Searching and Sorting****(5 Lectures)**

Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Insertion Sort, Shell Sort, Comparison of Sorting Techniques

**Hashing****(5 Lectures)**

Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering, Resolving collision by Open Addressing, Coalesced Hashing, Separate Chaining, Dynamic and Extendible Hashing, Choosing a Hash Function, Perfect Hashing Function

**Reference Books:**

- Data Structures using C", by Y.Kanetkar.
- Data structure by R.B Patel
- Data structures using C by A.M Padma Reddy

**COMPUTER PRACTICAL- C 5 LAB****60 Lectures****Marks : Pr (ESE: 3Hrs)=75****Pass Marks: Pr (ESE) = 30*****Instruction to Question Setter for  
Practical Examination (ESE Pr)***

There will be **three** group of questions in Practical Examination of 3Hrs **Group A** having questions from **CORE PAPER 5(CC5)** will contain **four** questions , out of which any two are to be answered **Group B** having questions from **CORE PAPER 6(CC6)** will contain **four** questions , out of which any two are to be answered **Group C** having questions from **CORE PAPER 7(CC7)** will contain **two** questions , out of which any one is to be answered.

**Lab:** Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

**Assignment:** The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.

**Marks Distribution:**

LAB(Experiment + Answer script)	= 45 marks
Assignment	=15 marks
Viva-voce	=15 marks

**DATA STRUCTURES**

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
3. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
4. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List implementation.
7. Perform Stack operations using Array implementation. Use Templates.
8. Perform Queues operations using Circular Array implementation. Use Templates.
9. Create and perform different operations on Double-ended Queues using Linked List implementation.
10. WAP to calculate factorial and to compute the factors of a given no. (i)using recursion, (ii) using iteration
11. WAP to display fibonacci series (i)using recursion, (ii) using iteration
12. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
13. WAP to create a Binary Search Tree and include following operations in tree:
  - a. Insertion (Recursive and Iterative Implementation)
  - b. Deletion by copying
  - c. Deletion by Merging
  - d. Search a no. in BST
  - e. Display its preorder, postorder and inorder traversals Recursively
  - f. Display its preorder, postorder and inorder traversals Iteratively
  - g. Display its level-by-level traversals
  - h. Count the non-leaf nodes and leaf nodes
  - i. Display height of tree
  - j. Create a mirror image of tree
  - k. Check whether two BSTs are equal or not

**IV. CORE COURSE -C 6:**

(Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100

Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10

***Instruction to Question Setter for******Mid Semester Examination (MSE):***

There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.

***End Semester Examination (ESE):***

There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.

**Note:** There may be subdivisions in each question asked in Theory Examinations.

**OPERATING SYSTEMS****Theory: 60 Lectures****1. Introduction****(10 Lectures)**

Basic OS functions, resource abstraction, types of operating systems—multiprogramming systems, batch systems, time sharing systems; operating systems for personal computers & workstations, process control & real time systems.

**2. Operating System Organization****(6 Lectures)**

Processor and user modes, kernels, system calls and system programs.

**3. Process Management****(20 Lectures)**

System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms; concurrent and processes, critical section, semaphores, methods for inter-process communication; deadlocks.

Physical and virtual address space; memory allocation strategies -fixed and variable partitions, paging, segmentation, virtual memory

**5. File and I/O Management****(10 Lectures)**

Directory structure, file operations, file allocation methods, device management.

**6. Protection and Security****(4 Lectures)**

Policy mechanism, Authentication, Internal access Authorization.

**Reference Books:**

- A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8Edition, John Wiley Publications 2008.
- A.S. Tanenbaum, Modern Operating Systems, 3<sup>rd</sup> Edition, Pearson Education 2007.
- Gagne galvin, Operating Systems: 10th Edition .
- W. Stallings, Operating Systems, Internals & Design Principles, 5<sup>th</sup> Edition, Prentice Hall of India. 2008

**COMPUTER PRACTICAL- C 6 LAB****60 Lectures**

1. Write a program (using *fork()* and/or *exec()* commands) where parent and child execute:
    - a. same program, same code.
    - b. same program, different code.-
    - c. before terminating, the parent waits for the child to finish its task.
  2. Write a program to report behaviour of Linux kernel including kernel version, CPU type and model. (CPU information)
  3. Write a program to report behaviour of Linux kernel including information on configured memory, amount of free and used memory. (memory information)
  4. Write a program to print file details including owner access permissions, file access time, where file name is given as argument.
  5. Write a program to copy files using system calls.
  6. Write program to implement FCFS scheduling algorithm.
  7. Write program to implement Round Robin scheduling algorithm.
  8. Write program to implement SJF scheduling algorithm.
  9. Write program to implement non-preemptive priority based scheduling algorithm.
  10. Write program to implement preemptive priority based scheduling algorithm.
  11. Write program to implement SRJF scheduling algorithm.
  12. Write program to calculate sum of n numbers using *thread* library.
  13. Write a program to implement first-fit, best-fit and worst-fit allocation strategies.
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**V. CORE COURSE -C 7:**

(Credits: Theory-04, Practicals-01)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for  
Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type three questions of five marks each, out of which any two are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**COMPUTER NETWORKS THEORY****Theory: 60 Lectures****1. Introduction to Computer Networks****(8 Lectures)**

Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

**2. Data Communication Fundamentals and Techniques****(10 Lectures)**

Analog and digital signal; data-ratelimits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques-FDM, TDM; transmission media.

**3. Networks Switching Techniques and Access mechanisms****(10 Lectures)**

Circuit switching; packets witching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

**4. Data Link Layer Functions and Protocol****(10 Lectures)**

Error detection and error correction techniques ;data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.

**5. Multiple Access Protocol and Networks****(5 Lectures)**

CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways;

**6. Networks Layer Functions and Protocols****(6 Lectures)**

Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols.

**7. Transport Layer Functions and Protocols****(6 Lectures)**

Transport services- error and flow control, Connection establishment and release- three way handshake;

**8. Overview of Application layer protocol****(5 Lectures)**

Overview of DNS protocol; overview of WWW & HTTP protocol.

**Reference Books:**

- B. A. Forouzan: Data Communications and Networking, Fourth edition, THM, 2007.
- S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002

**COMPUTER PRACTICAL-C 7 LAB****60 Lectures****SECTION I**

1. Explain the following networking protocols with their syntax.  
Ping, ipstat, http, ftp, ip config, netstat, lpr.
2. Configure TCP
3. Configure Router
4. Configure Remote Machine
5. Internetworking devices:- NIC, Modems, Repeaters, Routers, Hubs, Bridges, Switches and Gateways.

**SECTION II**

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
  2. Simulate and implement stop and wait protocol for noisy channel.
  3. Simulate and implement go back n sliding window protocol.
  4. Simulate and implement selective repeat sliding window protocol.
  5. Simulate and implement distance vector routing algorithm
  6. Simulate and implement Dijkstra algorithm for shortest path routing.
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**SEMESTER IV**


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**5 Papers****Total 100 x 5 = 500 Marks****I. SKILL ENHANCEMENT COURSE SEC 2:**

(Credits: Theory-02)

**Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs) =100****Pass Marks ESE = 40*****Guidelines to Examiners for******End Semester Theory Examination (ESE): F.M.=75***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

***End Semester Practical Examination (ESE Pr): Viva-voce /Assignment/Lab work, F.M.=25***

**PHP PROGRAMMING****Theory: 15 Lectures****1. Introduction to PHP****(3L)**

PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.)

PHP with other technologies, scope of PHP

Basic Syntax, PHP variables and constants

Types of data in PHP , Expressions, scopes of a variable (local, global)

PHP Operators : Arithmetic, Assignment, Relational , Logical operators, Bitwise , ternary and MOD operator.

PHP operator Precedence and associativity

**2. Handling HTML from with PHP****(2L)**

Capturing Form Data

GET and POST form methods

Dealing with multi value fields

Redirecting a form after submission

**3. PHP conditional events and Loops****(2L)**

PHP IF Else conditional statements ( Nested IF and Else)

Switch case, while ,For and Do While Loop

Goto , Break ,Continue and exit

**4. PHP Functions:****(3L)**

Function, Need of Function , declaration and calling of a function

PHP Function with arguments, Default Arguments in Function

Function argument with call by value, call by reference

Scope of Function Global and Local

**5. String Manipulation and Regular Expression:****(3L)**

Creating and accessing String, Searching & Replacing String

Formatting, joining and splitting String, String Related Library functions

Use and advantage of regular expression over inbuilt function

Use of preg\_match(), preg\_replace(), preg\_split() functions in regular expression Reference

**6. Array:****(2L)**

Anatomy of an Array, Creating index based and Associative array ,Accessing array

Looping with Index based array, with associative array using each() and foreach()

Some useful Library function



**Reference Books:**

- Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007.
- Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.
- Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition Paperback, O'reilly, 2014.
- Luke Welling, Laura Thompson, "PHP and MySQL Web Development", 4th Edition, Addition Paperback, Addison-Wesley Professional, 2008.
- David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 2014.

**SKILL ENHANCEMENT LAB- SEC 2 LAB****15 Lectures****Marks : Pr (ESE: 3Hrs)=25****Pass Marks: Pr (ESE) = 10*****Instruction to Question Setter for  
Practical Examination (ESE)***

There will be **four** questions in Practical Examination of 3Hrs. from **SKILL ENHANCEMENT PAPER 2 (SEC2)** out of which any two are to be answered.

**Lab:** Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

**Assignment:** The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.

**Marks Distribution:**

LAB(Experiment + Answer script)	= 15 marks
Assignment	=05 marks
Viva-voce	=05 marks

**SOFTWARE LAB BASED ON PHP PROGRAMMING:**

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.
3. WAP to check whether the given number is prime or not.
4. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string.
5. Write a PHP function that checks if a string is all lower case.
6. Write a PHP script that checks whether a passed string is palindrome or not? ( A palindrome is word, phrase, or sequence that reads the same backward as forward, e.g., madam or nurses run)
7. WAP to sort an array.
8. Write a PHP script that removes the whitespaces from a string.
  - a. Sample string : "The quick " " brown
  - b. fox'      Expected      Output :
  - c. Thequick""brownfox
9. Write a PHP script that finds out the sum of first n odd numbers.
10. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.
11. Write a simple PHP program to check that emails are valid

**II. GENERIC ELECTIVE (GE 4):****(Credits: 06)**

All Four Papers (One paper to be studied in each semester) of any One Subject to be opted other than the Honours Subject. Refer Content from the Syllabus of Opted Generic Elective Subject.

**III. CORE COURSE -C 8:**

(Credits: Theory-04, Practicals-02)

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100

Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10

***Instruction to Question Setter for******Mid Semester Examination (MSE):***

There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.

***End Semester Examination (ESE):***

There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.

**Note:** There may be subdivisions in each question asked in Theory Examinations.

**DESIGN AND ANALYSIS OF ALGORITHMS****Lectures: 60****1. Introduction****( 5 Lectures)**

Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm.

**2. Algorithm Design Techniques****( 8 Lectures)**

Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.

**3. Sorting and Searching Techniques****(20 Lectures)**

Elementary sorting techniques–Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques - Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques, Medians &amp; Order Statistics, complexity analysis;

**4. Lower Bounding Techniques****( 5 Lectures)**

Decision Trees

**5. Balanced Trees****( 7 Lectures)**

Red-Black Trees

**6. Advanced Analysis Technique****( 5 Lectures)**

Amortized analysis

**7. Graphs****(5 Lectures)**

Graph Algorithms–Breadth First Search, Depth First Search and its Applications, Minimum Spanning Trees.

**Reference Books:**

- T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithms, PHI, 3rd Edition 2009
- Sarabasse & A.V. Gelder Computer Algorithm – Introduction to Design and Analysis, Publisher Pearson 3rd Edition 1999

**COMPUTER PRACTICAL- C 8 LAB****60 Lectures**

Marks : Pr (ESE: 3Hrs)=75

Pass Marks: Pr (ESE) = 30

***Instruction to Question Setter for******Practical Examination (ESE Pr)***

There will be **three** group of questions in Practical Examination of 3Hrs **Group A** having questions from **CORE PAPER 8(CC8)** will contain **four** questions , out of which any two are to be answered **Group B** having questions from **CORE PAPER 10(CC10)** will contain **four** questions , out of which any two are to be answered **Group C** having questions from **CORE PAPER 9(CC9)** will contain **two** questions , out of which any one is to be answered.

**Lab:** Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

**Assignment:** The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.

**Marks Distribution:**

LAB(Experiment + Answer script) = 45 marks

Assignment = 15 marks

Viva-voce = 15 marks

**DESIGN AND ANALYSIS OF ALGORITHMS**

1.
  - i. Implement Insertion Sort (The program should report the number of comparisons)
  - ii. Implement Merge Sort (The program should report the number of comparisons)
2. Implement Heap Sort(The program should report the number of comparisons)
3. Implement Randomized Quick sort (The program should report the number of comparisons)
4. Implement Radix Sort
5. Create a Red-Black Tree and perform following operations on it:
  - i. Insert a node
  - ii. Delete a node
  - iii. Search for a number & also report the color of the node containing this number.
6. Write a program to determine the LCS of two given sequences
7. Implement Breadth-First Search in a graph
8. Implement Depth-First Search in a graph
9. Write a program to determine the minimum spanning tree of a graph

For the algorithms at S.No 1 to 3 test run the algorithm on 100 different inputs of sizes varying from 30 to 1000. Count the number of comparisons and draw the graph. Compare it with a graph of  $n \log n$ .

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**IV. CORE COURSE -C 9:**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for  
Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type three questions of five marks each, out of which any two are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**SOFTWARE ENGINEERING THEORY****Lectures: 60; Tutorials: 10****1. Introduction****(8 Lectures)**

The Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Engineering as a Layered Technology, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI).

**2. Requirement Analysis****(10 Lectures)**

Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS.

**3. Software Project Management****(8Lectures)**

Estimation in Project Planning Process, Project Scheduling.

**4. Risk Management****(8 Lectures)**

Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan.

**5. Quality Management****(8 Lectures)**

Quality Concepts, Software Quality Assurance, Software Reviews, Metrics for Process and Projects.

**6. Design Engineering****(10 Lectures)**

Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture, Modeling Component Level Design.

**7. Testing Strategies & Tactics****(8 Lectures)**

Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type, Basis Path Testing.

**Reference Books:**

- R.S. Pressman, Software Engineering: A Practitioner's Approach (7<sup>th</sup> Edition), McGraw-Hill, 2009.
- P. Jalote, An Integrated Approach to Software Engineering (2<sup>nd</sup> Edition), Narosa Publishing House, 2003.
- K.K. Aggarwal and Y. Singh, Software Engineering (2<sup>nd</sup> Edition), New Age International Publishers, 2008.

**COMPUTER PRACTICAL-C 9 LAB****60 Lectures**

Understanding SRS (Elements of SRS), Creation of SRS according to IEEE standard.

Case Study of-

1. Online Retail Shopping Management System.
2. Online Hotel Reservation System.
3. Examination & Result Computation System.
4. Automatic Internal Assessment System.
5. Parking allocation system.
6. Whole Sale Management System

**V. CORE COURSE -C 10:**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for******Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type three questions of five marks each, out of which any two are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**DATABASE MANAGEMENT SYSTEMS****Theory: 60 Lectures**

- 1. 1.Introduction** ( 6 Lectures)  
Characteristics of database approach, data models, database system architecture and data independence.
- 2. 2.Entity Relationship(ER) Modeling** (8 Lectures)  
Entity types, relationships, constraints.
- 3. 3.Relation data model** (20 Lectures)  
Relational model concepts, relational constraints, relational algebra, SQL queries
- 4. 4.Database design** (15 Lectures)  
Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (upto BCNF).
- 5. Transaction Processing** (3 Lectures)  
ACID properties, concurrency control
- 6. 6. File Structure and Indexing** (8 Lectures)  
Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files( Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.

**Reference Books:**

- R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6<sup>th</sup> Edition, Pearson Education, 2010.
- A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6<sup>th</sup> Edition, McGraw Hill, 2010.

**COMPUTER PRACTICAL-C 10 LAB****60 Lectures****DATABASE MANAGEMENT SYSTEMS**

Create and use the following database schema to answer the given queries.

<b>EMPLOYEE Schema</b>			
<b>Field</b>	<b>Type</b>	<b>NULL KEY</b>	<b>DEFAULT</b>
Eno	Char(3)	NO            PRI	NIL
Ename	Varchar(50)	NO	NIL
Job_type	Varchar(50)	NO	NIL
Manager	Char(3)	Yes            FK	NIL
Hire_date	Date	NO	NIL
Dno	Integer	YES            FK	NIL
Commission	Decimal(10,2)	YES	NIL
Salary	Decimal(7,2)	NO	NIL

<b>DEPARTMENT Schema</b>			
<b>Field</b>	<b>Type</b>	<b>NULL KEY</b>	<b>DEFAULT</b>
Dno	Integer	No PRI	NULL
Dname	Varchar(50)	Yes	NULL
Location	Varchar(50)	Yes	New Delhi

**Query List****SECTION-I**

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE\_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than \$2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of \$1500 and \$2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don't have a current Manager.

**SECTION-II**

1. Query to display the Name, Salary and Commission for all the employees who earn commission.
  2. Sort the data in descending order of Salary and Commission.
  3. Query to display Name of all the employees where the third letter of their name is A.
  4. Query to display Name of all employees either have two R's or have two A's in their name and are either in Dept No = 30 or their Manger's Employee No = 7788.
  5. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
  6. Query to display the Current Date.
  7. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
  8. Query to display Name and calculate the number of months between today and the date each employee was hired.
  9. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 \* Current Salary >. Label the Column as Dream Salary.
  10. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with J, A and M.
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**SEMESTER V**


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**4 Papers****Total 100 x 4 = 400 Marks**

(Credits: Theory-04, Practicals-02)

**I. B.C.A. SPECIFIC (DSE 1):****Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for  
Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type three questions of five marks each, out of which any two are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**INFORMATION SECURITY****Theory: 60 Lectures****1. Introduction**

Security, Attacks, Computer Criminals, Security Services, Security Mechanisms.

**2. Cryptography**

Substitution ciphers, Transpositions Cipher, Confusion, diffusion, Symmetric, Asymmetric Encryption. DES Modes of DES, Uses of Encryption, Hash function, key exchange, Digital Signatures, Digital Certificates.

**3. Program Security**

Secure programs, Non malicious Program errors, Malicious codes virus, Trap doors, Salami attacks, Covert channels, Control against program

**4. Threats.**

Protection in OS: Memory and Address Protection, Access control, File Protection, User Authentication.

**5. Database Security**

Requirements, Reliability, Integrity, Sensitive data, Inference, Multilevel Security.

**6. Security in Networks**

Threats in Networks, Security Controls, firewalls, Intrusion detection systems, Secure e-mails

**7. Administrating Security**

Security Planning, Risk Analysis, Organizational Security Policy, Physical Security. Ethical issues in Security: Protecting Programs and data. Information and law.

**Reference Books:**

- C. P. Pfleeger, S. L. Pfleeger; Security in Computing, Prentice Hall of India, 2006
  - W. Stallings; Network Security Essentials: Applications and Standards, 4/E, 201
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**DISCIPLINE SPECIFIC ELECTIVE LAB- DSE 1 LAB****60 Lectures****Marks : Pr (ESE: 3Hrs)=50****Pass Marks: Pr (ESE) = 20*****Instruction to Question Setter for******Practical Examination (ESE)***

*There will be two group of questions in Practical Examination of 3Hrs.. Group A having questions from DISCIPLINE SPECIFIC ELECTIVE PAPER 1(DSE1) will contain four questions, out of which any two are to be answered Group B having questions from DISCIPLINE SPECIFIC ELECTIVE PAPER 2 (DSE2) will contain four questions, out of which any two is to be answered.*

**Lab:** Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

**Assignment:** The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.

**Marks Distribution:**

LAB(Experiment + Answer script)	= 30 marks
Assignment	=10 marks
Viva-voce	=10 marks

**INFORMATION SECURITY**

1. Demonstrate the use of Network tools: ping, ipconfig, ifconfig, tracert, arp, netstat, whois
  2. Use of Password cracking tools : John the Ripper, Ophcrack. Verify the strength of passwords using these tools.
  3. Perform encryption and decryption of Caesar cipher. Write a script for performing these operations.
  4. Perform encryption and decryption of a Rail fence cipher. Write a script for performing these operations Use nmap/zenmap to analyse a remote machine.
  5. Use Burp proxy to capture and modify the message.
  6. Demonstrate sending of a protected word document.
  7. Demonstrate sending of a digitally signed document.
  8. Demonstrate sending of a protected worksheet.
  9. Demonstrate use of steganography tools.
  10. Demonstrate use of gpg utility for signing and encrypting purposes.
-

**II. B.C.A. SPECIFIC (DSE 2):**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for  
Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type three questions of five marks each, out of which any two are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**CLOUD COMPUTING****Theory: 60 Lectures; Tutorial: 10****1. Overview of Computing Paradigm****( 8 lectures)**

Recent trends in Computing : Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing,

**2. Introduction to Cloud Computing****( 7 lectures)**

Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing,

**3. Cloud Computing Architecture****( 20 lectures)**

Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), How Cloud Computing Works, Deployment Models- Public cloud, Private cloud, Hybrid cloud, Community cloud, Case study of NIST architecture.

**4. Case Studies****( 13 lectures)**

Case study of Service model using Google App Engine, Microsoft Azure, Amazon EC2 , Eucalyptus.

**5. Service Management in Cloud Computing****( 7 lectures)**

Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling.

**6. Cloud Security****( 5 lectures)**

Infrastructure Security- Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in cloud computing.

**Reference Books**

- Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
- Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
- Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
- Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010
- Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications , Adobe Reader ebooks available from eBooks.com,2010
- Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach ,McGraw Hills, 2010.
- Dimitris N. Chorafas, Cloud Computing Strategies ,CRC Press, 2010

**DISCIPLINE SPECIFIC ELECTIVE LAB- DSE 2 LAB****60 Lectures****CLOUD COMPUTING**

1. Create virtual machines that access different programs on same platform.
  2. Create virtual machines that access different programs on different platforms .
  3. Working on tools used in cloud computing online- a) Storage b) Sharing of data c) manage your calendar, to-do lists, d) a document editing tool
  4. Exploring Google cloud
  5. Exploring microsoft cloud
  6. Exploring amazon cloud
-

**III. CORE COURSE -C 11:**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for******Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type three questions of five marks each, out of which any two are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**INTERNET TECHNOLOGIES****Theory: 60 Lectures****1. Java**

Use of Objects, Array and Array List class

**(5 lectures)****2. JavaScript**

Data types, operators, functions, control structures, events and event handling.

**(15 lectures)****3. JDBC**

JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

**(10 lectures)****4. JSP**

Introduction to Java Server Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

**(20 lectures)****5. Java Beans**

Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

**(10 lectures)****Reference Books:**

- Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
- Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
- Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
- Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.
- O'Reilly , Java Server Pages, Hans Bergsten, Third Edition, 2003.

**COMPUTER PRACTICAL- C 11 LAB****60 Lectures****Marks : Pr (ESE: 3Hrs)=25****Pass Marks: Pr (ESE) = 10*****Instruction to Question Setter for******Practical Examination (ESE)***

There will be **four** questions in Practical Examination of 3Hrs. from **CORE PAPER 11(CC11)** out of which any two are to be answered.

**Lab:** Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

**Assignment:** The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.

***Marks Distribution:***

<i>LAB(Experiment + Answer script)</i>	<i>= 15 marks</i>
<i>Assignment</i>	<i>=05 marks</i>
<i>Viva-voce</i>	<i>=05 marks</i>

**INTERNET TECHNOLOGIES****Create event driven program for following:**

1. Print a table of numbers from 5 to 15 and their squares and cubes using alert.
  2. Print the largest of three numbers.
  3. Find the factorial of a number n.
  4. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
  5. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
  6. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.
-

**IV. CORE COURSE -C 12:**

(Credits: Theory-05, Tutorial-01)

**Marks : 25 (MSE: 1Hr) + 75 (ESE: 3Hrs)=100****Pass Marks (MSE + ESE) =40*****Instruction to Question Setter for******Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type six questions of five marks each, out of which any four are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**THEORY OF COMPUTATION****Theory: 60 Lectures; Tutorial: 10****1. 1. Languages****(8 Lectures)**

Alphabets, string, language, Basic Operations on language, Concatenation, Kleene Star

**2. Finite Automata and Regular Languages****(20 Lectures)**

Regular Expressions, Transition Graphs, Deterministics and non-deterministic finite automata, NFA to DFA Conversion, Regular languages and their relationship with finite automata, Pumping lemma and closure properties of regular languages.

**3. Context free languages****(17 Lectures)**

Context free grammars, parse trees, ambiguities in grammars and languages, Pushdown automata (Deterministic and Non-deterministic), Pumping Lemma, Properties of context free languages, normal forms.

**4. 4.Turing Machines and Models of Computations****(15 Lectures)**

RAM, Turing Machine as a model of computation, Universal Turing Machine, Language acceptability, decidability, halting problem, Recursively enumerable and recursive languages, unsolvability problems.

**Reference Books**

- Daniel I.A.Cohen, Introduction to computer theory, John Wiley,1996
- Lewis & Papadimitriou, Elements of the theory of computation, PHI 1997.
- Hoperoft, Aho, Ullman, Introduction to Automata theory, Language & Computation –3<sup>rd</sup> Edition, Pearson Education. 2006
- Theory of automata by K.L.P Mishra and N Chandrashekharan

**SEMESTER VI****4 Papers****Total 100 x 4 = 400 Marks**

(Credits: Theory-04, Practicals-02)

**I. B.C.A. SPECIFIC (DSE 3):**

Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100	Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10
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**Instruction to Question Setter for Mid Semester Examination (MSE):**

There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.

**End Semester Examination (ESE):**

There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.

**Note:** There may be subdivisions in each question asked in Theory Examinations.

**NUMERICAL METHODS****Theory: 60 Lectures**

1. Floating point representation and computer arithmetic, Significant digits, Errors: Round-off error, Local truncation error, Global truncation error, Order of a method, Convergence and terminal conditions, Efficient computations ( 6 Lectures)
2. Bisection method, Secant method, Regula-Falsi method ( 3 Lectures)
3. Newton-Raphson method, Newton's method for solving nonlinear systems ( 3 Lectures)
4. Gauss elimination method (with row pivoting) and Gauss-Jordan method, Gauss Thomas method for tridiagonal systems ( 6 Lectures)
5. Iterative methods: Jacobi and Gauss-Seidel iterative methods ( 5 Lectures)
6. Interpolation: Lagrange's form and Newton's form ( 4 Lectures)
7. Finite difference operators, Gregory Newton forward and backward differences Interpolation ( 5 Lectures)
8. Piecewise polynomial interpolation: Linear interpolation, Cubic spline interpolation (only method), Numerical differentiation: First derivatives and second order derivatives, Richardson extrapolation ( 10 Lectures)
9. Numerical integration: Trapezoid rule, Simpson's rule (only method), Newton-Cotes open formulas ( 5 Lectures)
10. Extrapolation methods: Romberg integration, Gaussian quadrature, Ordinary differential equation: Euler's method ( 5 Lectures)
11. Modified Euler's methods: Heun method and Mid-point method, Runge-Kutta second methods: Heun method without iteration, Mid-point method and Ralston's method Classical 4<sup>th</sup> order Runge-Kutta method, Finite difference method for linear ODE ( 8 Lectures)

**Reference Books:**

- Laurence V. Fausett, Applied Numerical Analysis, Using MATLAB, Pearson, 2/e (2012)
- M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012)
- Steven C Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, Tata McGraw Hill, 2/e (2010)

**COMPUTER PRACTICAL- DSE 3 LAB****60 Lectures****Marks : Pr (ESE: 3Hrs)=25****Pass Marks: Pr (ESE) = 10*****Instruction to Question Setter for******Practical Examination (ESE)***

*There will be four questions in Practical Examination of 3Hrs, from discipline specific elective paper 3(DSE3), out of which any two are to be answered*

**Lab:** *Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.*

**Assignment:** *The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.*

**Marks Distribution:**

*LAB(Experiment + Answer script) = 15 marks*

*Assignment =05 marks*

*Viva-voce =05 marks*

**NUMERICAL METHODS LAB**

1. Find the roots of the equation by bisection method.
2. Find the roots of the equation by secant/Regula-Falsi method.
3. Find the roots of the equation by Newton's method.
4. Find the solution of a system of nonlinear equation using Newton's method.
5. Find the solution of tridiagonal system using Gauss Thomas method.
6. Find the solution of system of equations using Jacobi/Gauss-Seidel method.
7. Find the cubic spline interpolating function.
8. Evaluate the approximate value of finite integrals using Gaussian/Romberg integration.
9. Solve the boundary value problem using finite difference method.

**Note:** Programming is to be done in any one of Computer Algebra Systems:  
MATLAB / MATHEMATICA / MAPLE

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**II. B.C.A. SPECIFIC (DSE 4):**

(Credits: -06)

Marks : 50 (OJT1&amp;OJT2) + 50 (LIVE PROJECT) =100      Pass Marks: 20 Th(OJT1+OJT2) +20 PROJECT =40

**A. ON JOB TRAINING (OJT):**

1. OJT is **ON JOB TRAINING**, Student have to do two months (**OJT1 One Month + OJT2 One Month**) industrial Training from different two IT origination (**Reference letter for OJT of must be issued from Concern Department**). Student has to produce daily report. In this daily report, Attendee sheet, Work culture and working hour list day by day, must be listed.
2. Student alone or in a group of not more than three, shall undertake **One Project Dissertation** approved by the Subject Teacher/H.O.D. of the Department/College concerned. The progress of the Project Dissertation shall be monitored by the faculty members at regular intervals, and followed by Internal Viva Examination of 50 marks.

**Academic Credits for training shall be based on following:**

A **Power Point presentation** (based on the report) for duration of **10 minutes** should be make. This will be presented in front of examiners. Marks will be awarded on this presentation and documents submitted to the faculty coordinator at the institute.

Students have to submit the following on completion of training to the concern faculty at the college:

1. Synopsis submission
2. Synopsis Approval will be given within a week from the date of submission.
3. Synopsis will be approved by concerned department faculty member.
4. Faculty members will be the internal guide of particular group of Students.
5. The group size will be minimum of 1 candidate and maximum of 3 candidates.
6. Group will present power point presentation in front of panel and submit the project status report within the 15 to 20 days from the date of approval.
7. Final Project Submission contains Hard copy, Soft copy & leave letter.  
Project hard copy contains
  - a) Front page
  - b) Certificate of Authenticity
  - c) Certificate of job Trainings (job1+job2)
  - d) Declaration
  - e) Acknowledgement
  - f) Table of content/index
  - g) Project guidelines (These points are mandatory)
    - (i). Introduction with Company profile.
    - (ii). Vision, mission & objective.
    - (iii). SWOT Analysis.
    - (iv). Chronology of Achievements.
    - (v). Topic introduction & discussion.
    - (vi). Its relevance & implication in company.
    - (vii). Findings.
    - (viii). conclusion
    - (ix). Further enhancement (Suggestion).
    - (x). Bibliography
    - (xi). Reference Website
    - (xii). CD (compact Disc)
  - h) The file should be Book Binding .One Project Report for office copy and each candidate must have its own copy.
8. Leave Card.

**The Training Report will be submitted in the form specified as under:**

- a. The typing should be done on both sides of the paper (instead of single side printing)
- b. The font size should be 12 with Times New Roman font.
- c. The Training Report may be typed in 1.5 line spacing.
- d. The paper should be A-4 size.

Two copies meant for the purpose of evaluation may be bound in paper- and submitted to the approved authority.

***Guidelines to Examiners for***

*Evaluation of OJT (By Internal) may be as per the following guidelines:*

*OJT1 = 10 marks*

*Daily Report1 = 05 marks*

*OJT2 = 10 marks*

*Daily Report2 = 05 marks*

*Presentation Performance = 10 marks*

*Viva-voce = 10 marks*

**B. PROJECT WORK/ DISSERTATION**

1. The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.
2. Student have to do a complete project, the technologies (front end + back end) should be chosen among the syllabus, where the front end will be designing & coding portion and back end will be database portion.
3. Student have to run the code as a live project and submit CD containing supporting software, frontend and backend coding in proper format.

***Guidelines to Examiners for***

*End Semester Examination (ESE Pr):*

*Project Evaluation (By Internal & External) may be as per the following guidelines:*

**Assigned by Internal Guide**

*Pre Submission*

*(Power Point Presentation) = 10 marks*

**Assigned by External Examiner**

*Programme Running in system = 20 marks*

*Project Report (Hard Copy) = 10 marks*

*Viva-voce = 10 marks*

**III. CORE COURSE -C 13:**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for******Mid Semester Examination (MSE):***

*There will be two group of questions. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type three questions of five marks each, out of which any two are to answer.*

***End Semester Examination (ESE):***

*There will be two group of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of ten questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to answer.*

*Note: There may be subdivisions in each question asked in Theory Examinations.*

**ARTIFICIAL INTELLIGENCE****Theory: 60 Lectures****1. Introduction****(06 Lectures)**

Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

**2. Problem Solving and Searching Techniques****(20 Lectures)**

Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A\* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

**3. Knowledge Representation****(20 Lectures)**

Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs. Programming in Logic (PROLOG)

**4. Dealing with Uncertainty and Inconsistencies****(08 Lectures)**

Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

**5. Understanding Natural Languages****(06 Lectures)**

Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

**Reference Books:**

- DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
- Russell & Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2<sup>nd</sup> edition, 2005.
- Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2<sup>nd</sup> edition, 1991.
- Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, Pearson Education, 3<sup>rd</sup> edition, 2000.

**COMPUTER PRACTICAL- C 13 LAB****60 Lectures****Marks : Pr (ESE: 3Hrs)=50****Pass Marks: Pr (ESE) = 20*****Instruction to Question Setter for******Practical Examination (ESE)***

There will be **two** group of questions in Practical Examination of 3Hrs.. **Group A** having questions from **CORE PAPER 13 (CC13)** will contain **four** questions, out of which any two are to be answered **Group B** having questions from **CORE PAPER 14 (CC14)** will contain **two** questions, out of which any one is to be answered.

**Lab:** Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

**Assignment:** The Assignment should be hand written in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.

**Marks Distribution:**

LAB(Experiment + Answer script)	= 30 marks
Assignment	=10 marks
Viva-voce	=10 marks

**ARTIFICIAL INTELLIGENCE**

1. Write a prolog program to calculate the sum of two numbers.
2. Write a prolog program to find the maximum of two numbers.
3. Write a prolog program to find the n<sup>th</sup> Fibonacci series.
4. Write a prolog program to find the factorial of a number.
5. Write a prolog program to implement GCD of 2 numbers.
6. Write a prolog program to implement palindrome.
7. Write a prolog program to implement reverse (list, reversed list) that reverses list.
8. Write a prolog program to implement append for two list.

**IV. CORE COURSE -C 14:**

(Credits: Theory-04, Practicals-02)

**Marks : 15 (MSE: 1Hr) + 60 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100****Pass Marks: Th (MSE +ESE) = 30 + Pr ESE =10*****Instruction to Question Setter for******Mid Semester Examination (MSE):***

There will be **two** group of questions. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type** three questions of five marks each, out of which any two are to answer.

***End Semester Examination (ESE):***

There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** five questions of fifteen marks each, out of which any three are to answer.

**Note:** There may be subdivisions in each question asked in Theory Examinations.

**COMPUTER GRAPHICS****Theory: 60 Lectures****1. Introduction****(5 Lectures)**

Basic elements of Computer graphics, Applications of Computer Graphics.

**2. Graphics Hardware****(8 Lectures)**

Architecture of Raster and Random scan display devices, input/output devices.

**3. Fundamental Techniques in Graphics****(22 Lectures)**

Raster scan line, circle and ellipse drawing, thick primitives, Polygon filling, line and polygon clipping algorithms, 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective), Vanishing points.

**4. Geometric Modeling****(10 Lectures)**

Representing curves &amp; Surfaces.

**5. Visible Surface determination****(8 Lectures)**

Hidden surface elimination.

**6. Surface rendering****(7 Lectures)**

Illumination and shading models. Basic color models and Computer Animation.

**Reference Books:**

- J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice 2<sup>nd</sup> edition Publication Addison Wesley 1990.
- D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
- D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
- D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill 2<sup>nd</sup> edition 1989.

**COMPUTER PRACTICAL-C 14 LAB****60 Lectures**

1. Write a program to implement Bresenham's line drawing algorithm.
  2. Write a program to implement mid-point circle drawing algorithm.
  3. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.
  4. Write a program to clip a polygon using Sutherland Hodgeman algorithm.
  5. Write a program to apply various 2D transformations on a 2D object (use homogenous coordinates).
  6. Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.
  7. Write a program to draw Hermite/Bezier curve.
-

SAMPLE CALCULATION FOR SGPA & CGPA FOR UNDERGRADUATE  
'B.Sc./B.A./B.Com/B.Voc. Honours' PROGRAMME

**Distribution of Credits Semester wise for Undergraduate Honours Courses**

**Table B-1: UG (B.A./ B.Sc./B.Com. /B.Voc Hons. Programme)**

**Semester wise distribution of 140 Credits**

	<b>CC</b>	<b>AECC</b>	<b>GE</b>	<b>SEC</b>	<b>DSE</b>	<b>Total credits</b>
Semester I	12	02	06			20
Semester II	12	02	06			20
Semester III	18		06	02		26
Semester IV	18		06	02		26
Semester V	12				12	24
Semester VI	12				12	24
	<b>84</b>	<b>04</b>	<b>24</b>	<b>04</b>	<b>24</b>	<b>140</b>

CC=Core Course; AECC=Ability Enhancement Compulsory Course; GE=Generic Elective; SEC=Skill Enhancement Course; DSE=Discipline Specific Elective

**Table B-3: Sample calculation for SGPA for B.Sc./B.A./B.Com/B.Voc. Honours Programme**

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit X Grade)	SGPA (Credit Point/Credit)
<b>Semester I</b>					
C-1	06	A	8	48	
C-2	06	B+	7	42	
AECC-1	02	B	6	12	
GE-1	06	B	6	36	
<b>Total</b>	<b>20</b>			<b>138</b>	<b>6.9 (138/20)</b>
<b>Semester II</b>					
C-3	06	B	6	36	
C-4	06	C	5	30	
AECC-2	02	B+	7	14	
GE-2	06	A+	9	54	
<b>Total</b>	<b>20</b>			<b>134</b>	<b>6.7 (134/20)</b>
<b>Semester III</b>					
C-5	06	A+	9	54	
C-6	06	O	10	60	
C-7	06	A	8	48	
SEC-1	02	A	8	16	
GE-3	06	O	10	60	
<b>Total</b>	<b>26</b>			<b>238</b>	<b>9.15 (238/26)</b>
<b>Semester IV</b>					
C-8	06	B	6	36	
C-9	06	A+	9	54	
C-10	06	B	6	36	
SEC-2	02	A+	9	18	
GE-4	06	A	8	48	
<b>Total</b>	<b>26</b>			<b>192</b>	<b>7.38 (192/26)</b>
<b>Semester V</b>					
C-11	06	B	6	36	
C-12	06	B+	7	42	
DSE-1	06	O	10	60	
DSE-2	06	A	8	48	
<b>Total</b>	<b>24</b>			<b>186</b>	<b>7.75 (186/24)</b>
<b>Semester VI</b>					
C-13	06	A+	9	54	
C-14	06	A	8	48	
DSE-3	06	B+	7	42	
DSE-4	06	A	8	48	
<b>Total</b>	<b>24</b>			<b>192</b>	<b>8.0 (192/24)</b>
<b>CGPA</b>					
<b>Grand Total</b>	<b>140</b>			<b>1080</b>	<b>7.71 (1080/140)</b>

**Table B-4: Sample calculation for CGPA for B.Sc./B.A./B.Com/B.Voc. Honours Programme**

Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI
Credit:20; SGPA:6.9	Credit:20; SGPA: 6.7	Credit:26; SGPA: 9.15	Credit:26; SGPA: 7.38	Credit:24; SGPA: 7.75	Credit:24; SGPA: 8.0

Thus CGPA= (20x6.9+20x6.7+26x9.15+26x7.38+24x7.75+24x8.0)/140=7.71



## MARKS DISTRIBUTION FOR EXAMINATIONS AND FORMAT OF QUESTION PAPERS

**Marks Distribution of Mid Semester Theory Examinations:****Table No. C1:** Marks distribution of Theory Examinations of Mid Semester

Topic	Code	Full Marks	Pass Marks	Time	Group-A (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions with Choices) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A	Group B
Mid Sem*	T15	15	6	1 Hr	5 x 1 = 5	2 (out of 3) x 5 = 10	5	3
	T25	25	10	1 Hr	5 x 1 = 5	4 (out of 6) x 5 = 20	5	6

**Marks Distribution of End Semester Theory Examinations:****Table No. C2:** Marks distribution of Theory Examinations of End Semester

Topic	Code	Full Marks	Pass Marks	Time	Group-A# (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions with Choices) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A#	Group B
End Sem	T60	60	24	3 Hrs	Q.No.1 (10x1) + 1x5 = 15	3 (out of 5) x 15 = 45	2	5
	T75	75	30	3 Hrs	Q.No.1 (10x1) + 1x5 = 15	4 (out of 6) x 15 = 60	2	6
	T100	100	40	3 Hrs	Q.No.1 (10x1) + 2x5 = 20	4 (out of 6) x 20 = 80	3	6
	T50 +T50	50X2=100	20	3 Hrs	2 x 5 = 10	2 (out of 3) x 20 = 40	2	3

# Question No.1 in Group-A carries 10 very short answer type 1 Mark Questions.

**Marks Distribution of Mid/End Semester Practical Examinations:****Table No. C3:** Marks distribution of Practical Examinations of End Semester

Topic	Code	Full Marks	Pass Marks	Time	Distribution of Marks			Total No. of Questions to Set
					Experiment	Record	Viva	
End Sem	P25	25	10	3 Hrs	15	5	5	
	P50	50	20	3 Hrs	30	10	10	Pr. with components of both papers
	P75	75	30	3 Hrs	45	15	15	Pr. with components of all three papers
	P100	100	40	3 Hrs	60	20	20	Pr. with components of all four papers

**Abbreviations :** T= Theory Examination, P= Practical Examination.

**Mid Sem\*** : There will be 15 Marks Theory Examination in Practical Subjects and 25 Marks Theory Examination in Non-Practical Subjects/ Papers. 25 Marks Theory Examination may include 10 Marks questions from Assignment/ Project/ Tutorial where ever applicable.

**Note** : There may be subdivisions in each question asked in Theory Examinations.

## FORMAT OF QUESTION PAPER FOR MID SEM EXAMINATION

OF

SUBJECTS WITH PRACTICAL



## Ranchi University, Ranchi

Mid Sem No.Exam Year

Subject/ Code

F.M. =15Time=1Hr.

### General Instructions:

समान्य निर्देश :

- i. **Group A** carries very short answer type compulsory questions.  
(खंड 'A' में अत्यंत लघु उत्तरीय अनिवार्य प्रश्न हैं।)
- ii. **Answer 2 out of 3** subjective/ descriptive questions given in **Group B**.  
(खंड 'B' के तीन में से किन्हीं दो विषयनिष्ठ/ वर्णनात्मक प्रश्नों के उत्तर दें।)
- iii. Answer in your own words as far as practicable.  
(यथासंभव अपने शब्दों में उत्तर दें।)
- iv. Answer all sub parts of a question at one place.  
(एक प्रश्न के सभी भागों के उत्तर एक साथ लिखें।)
- v. Numbers in right indicate full marks of the question.  
(पूर्णांक दायीं ओर लिखे गये हैं।)

### Group A

1. .... [5x1=5]
2. ....
3. ....
4. ....
5. ....

### Group B

6. .... [5]
7. .... [5]
8. .... [5]

**Note:** There may be subdivisions in each question asked in Theory Examination.

## FORMAT OF QUESTION PAPER FOR MID SEM EXAMINATION

OF

SUBJECTS WITHOUT PRACTICAL



## Ranchi University, Ranchi

Mid Sem No.Exam Year

**Subject/ Code**

**F.M.** =25**Time**=1Hr.

**General Instructions:**

समान्य निर्देश :

- i. **Group A** carries very short answer type compulsory questions.  
(खंड 'A' में अत्यंत लघु उत्तरीय अनिवार्य प्रश्न हैं।)
- ii. **Answer 4 out of 6** subjective/ descriptive questions given in **Group B**.  
(खंड 'B' के छः में से किन्हीं चार विषयनिष्ठ/ वर्णनात्मक प्रश्नों के उत्तर दें।)
- iii. Answer in your own words as far as practicable.  
(यथासंभव अपने शब्दों में उत्तर दें।)
- iv. Answer all sub parts of a question at one place.  
(एक प्रश्न के सभी भागों के उत्तर एक साथ लिखें।)
- v. Numbers in right indicate full marks of the question.  
(पूर्णांक दायीं ओर लिखे गये हैं।)

**Group A**

- |         |         |
|---------|---------|
| 1. .... | [5x1=5] |
| 2. .... |         |
| 3. .... |         |
| 4. .... |         |
| 5. .... |         |

**Group B**

- |          |     |
|----------|-----|
| 6. ....  | [5] |
| 7. ....  | [5] |
| 8. ....  | [5] |
| 9. ....  | [5] |
| 10. .... | [5] |
| 11. .... | [5] |

**Note:** There may be subdivisions in each question asked in Theory Examination.

## FORMAT OF QUESTION PAPER FOR END SEM EXAMINATION

OF

SUBJECTS WITH PRACTICAL



## Ranchi University, Ranchi

End Sem No.Exam Year

**Subject/ Code**

**F.M.** =60**P.M.**=30 (Including Mid Sem)**Time**=3Hrs.**General Instructions:**

- i. **Group A** carries very short answer type **compulsory** questions.
- ii. **Answer 3 out of 5** subjective/ descriptive questions given in **Group B**.  
(खंड 'B' के पाँच में से किन्हीं तीन विषयनिष्ठ/ वर्णनात्मक प्रश्नों के उत्तर दें।)
- iii. Answer in your own words as far as practicable.  
(यथासंभव अपने शब्दों में उत्तर दें।)
- iv. Answer all sub parts of a question at one place.  
(एक प्रश्न के सभी भागों के उत्तर एक साथ लिखें।)
- v. Numbers in right indicate full marks of the question.  
(पूर्णांक दायीं ओर लिखे गये हैं।)

### Group A

- |    |            |           |
|----|------------|-----------|
| 1. |            | [10x1=10] |
|    | i. ....    |           |
|    | ii. ....   |           |
|    | iii. ....  |           |
|    | iv. ....   |           |
|    | v. ....    |           |
|    | vi. ....   |           |
|    | vii. ....  |           |
|    | viii. .... |           |
|    | ix. ....   |           |
|    | x. ....    |           |
| 2. | .....      | [5]       |

### Group B

- |    |       |      |
|----|-------|------|
| 3. | ..... | [15] |
| 4. | ..... | [15] |
| 5. | ..... | [15] |
| 6. | ..... | [15] |
| 7. | ..... | [15] |

**Note:** There may be subdivisions in each question asked in Theory Examination.

## FORMAT OF QUESTION PAPER FOR END SEM EXAMINATION

OF

SUBJECTS WITHOUT PRACTICAL



## Ranchi University, Ranchi

End Sem No.Exam Year

**Subject/ Code**

**F.M.** =75**P.M.**=40 (Including Mid Sem)**Time**=3Hrs.

**General Instructions:**

- i. **Group A** carries very short answer type **compulsory** questions.
- ii. **Answer 4 out of 6** subjective/ descriptive questions given in **Group B**.  
(खंड 'B' के छः में से किन्हीं चार विषयनिष्ठ/ वर्णनात्मक प्रश्नों के उत्तर दें।)
- iii. Answer in your own words as far as practicable.  
(यथासंभव अपने शब्दों में उत्तर दें।)
- iv. Answer all sub parts of a question at one place.  
(एक प्रश्न के सभी भागों के उत्तर एक साथ लिखें।)
- v. Numbers in right indicate full marks of the question.  
(पूर्णांक दायीं ओर लिखे गये हैं।)

**Group A**

1. [10x1=10]
- i. ....
  - ii. ....
  - iii. ....
  - iv. ....
  - v. ....
  - vi. ....
  - vii. ....
  - viii. ....
  - ix. ....
  - x. ....

2. .... [5]

**Group B**

3. .... [15]
4. .... [15]
5. .... [15]
6. .... [15]
7. .... [15]
8. .... [15]

**Note:** There may be subdivisions in each question asked in Theory Examination.

## FORMAT OF QUESTION PAPER FOR END SEM EXAMINATION

OF

GE, SEC, GENERAL &amp; AECC HINDI/ ENGLISH COMMUNICATION



## Ranchi University, Ranchi

End Sem No.Exam Year

### Subject/ Code

**F.M.** =100**P.M.**=40**Time**=3Hrs.**General Instructions:**

- i. **Group A** carries very short answer type **compulsory** questions.
- ii. **Answer 4 out of 6** subjective/ descriptive questions given in **Group B**.  
(खंड 'B' के छः में से किन्हीं चार विषयनिष्ठ/ वर्णनात्मक प्रश्नों के उत्तर दें।)
- iii. Answer in your own words as far as practicable.  
(यथासंभव अपने शब्दों में उत्तर दें।)
- iv. Answer all sub parts of a question at one place.  
(एक प्रश्न के सभी भागों के उत्तर एक साथ लिखें।)
- v. Numbers in right indicate full marks of the question.  
(पूर्णांक दायीं ओर लिखे गये हैं।)

### Group A

- |    |            |           |
|----|------------|-----------|
| 1. | .....      | [10x1=10] |
|    | i. ....    |           |
|    | ii. ....   |           |
|    | iii. ....  |           |
|    | iv. ....   |           |
|    | v. ....    |           |
|    | vi. ....   |           |
|    | vii. ....  |           |
|    | viii. .... |           |
|    | ix. ....   |           |
|    | x. ....    |           |
| 2. | .....      | [5]       |
| 3. | .....      | [5]       |

### Group B

- |    |       |      |
|----|-------|------|
| 4. | ..... | [20] |
| 5. | ..... | [20] |
| 6. | ..... | [20] |
| 7. | ..... | [20] |
| 8. | ..... | [20] |
| 9. | ..... | [20] |

**Note:** There may be subdivisions in each question asked in Theory Examination.