FUNDAMENTALS OF INFORMATION TECHNOLOGY

Course Code - Category: IT 114 - ES

L	T	P	E	O
3	0	0	1	2

End Exam: 3 Hours

Credits: 3

Sessional Marks:40

End Exam Marks:60

Prerequisite: Nil

Course Objective:

This course aims in introducing skills relating to IT basics, computer applications, programming, interactive medias, Internet basics etc.

Course Outcomes:

After completion of this course, a student will be able to:
1.Understand basic concepts of computer ,Input-output and processing.
2.Know the concepts of operating systems , databases , computer software and Telecommunications
3 Understand the fundaments of computer networks , data processing , internet and security
4. Have an idea about multimedia , cryptography , artificial intelligence and data warehouse
5. Know the application of computers and Information technology

CO-PO Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	1	0	0	0	0	0	3	0
CO2	3	3	3	2	3	1	0	0	3	0	2	0
CO3	3	3	3	2	3	3	3	3	0	0	2	3
CO4	3	3	1	0	3	0	2	0	0	0	2	3
CO5	3	3	2	1	3	2	3	0	2	3	3	3

UNIT – I   10 Periods

Introduction to Computers ,Five Generations of Modern Computers ,Classification of Digital Computer Systems ,Anatomy of a Digital Computer , Central Processing Unit (CPU) and Memory ,Secondary (Auxiliary) Storage Devices ,Input Devices , Output Devices

UNIT – II   **10 Periods**

Introduction to Computer Software ,Introduction to Software Development ,Programming Languages ,Operating Systems ,General Software Features and Trends ,Introduction to Database Management Systems ,Introduction to Telecommunications

UNIT – III   **10 Periods**

Computer Networks ,Communications Systems ,Distributed Data Processing ,Internet & World Wide Web ,Introduction to Intranets ,Introduction to E-commerce and E-business ,Introduction to Web Design ,Introduction to Computer Security

UNIT – IV   **10 Periods**

Cryptography , Computer Viruses, Bombs and Worms ,Introduction to Multimedia
Introduction to Virtual Reality, Introduction to Hypermedia ,Artificial Intelligence and
Business Intelligence ,Data Warehouses and Data Marts

UNIT – V   **8 Periods**

Enterprise Resource Planning (ERP) ,Supply Chain Management (SCM) ,Customer Relationship Management (CRM) ,Geographic Information System (GIS),Computer in Business and Industry, Computers at Home, Computers in Education and Training ,Computers in Entertainment, Science, Medicine, and Engineering ,Mobile Computing and Business on the Internet

Text Book :
 1. **Alexis Leon & Mathews Leon "***Fundamentals of Information Technology***"** Second
    Edition, Vikas Publisher,

Reference Book:
 1. Peter Norton "*Introduction to Computers*" Second Edition

Problem Solving With C

(Common to all branches)

Course Code - Category : IT 115 - ES

L	T	P	E	O
3	**0**	**0**	**1**	**6**

End Exam: 3 Hours

Credits: 3

Sessional Marks:40

End Exam Marks:60

Prerequisite: No specific prerequisites are needed

Course Objectives:

- This course aims to provide exposure to problem-solving through programming in C. It aims to train the student, the concepts of C-Programming Language. This course involves a lab component which is designed to give the student hands-on experience with the concepts.

Course Outcomes:

After completion of this course, a student will be able to:	
CO 1	Gain knowledge in problem solving and steps in Program development.
CO2	Apply the basic concepts of C
CO 3	Implement different operations on arrays and string to solve any given problem.
CO 4	Demonstrate pointers and modularization
CO 5	Apply structures and unions and Implement file Operations in C programming for any given

CO PO Matrix														
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	PSO1	PSO2
CO1	3	3	2	3		1	1	1	2	1		1	2	2
CO2	1	2	2	2	1								2	1
CO3	2	1	2	1	2								3	2
CO4	2	3	2	2	2	2	2	2	3	3	2	2	3	3
CO5	2	1	2	1	2								3	2

SYLLABUS

UNIT I   10 Periods

Introduction to Computer Problem-solving : Introduction ,The Problem-solving Aspect, Top-Down Design, Implementation of Algorithms, Program Verification   **(Text Book 3 Page 1-29 or Reference material 1)**
Computer Science as a Career Path : Why Computer Science May be the Right Field for You, The College Experience: Computer Disciplines and Majors to Choose From Career Opportunities.
Electronic Computers Then and Now, Computer Hardware, Computer Software, The Software

Development Method, Applying the Software Development Method, Professional Ethics for Computer Programmers. **(Text Book 2 Page 1-39)**
Computer Languages, Writing Editing compiling and linking programs, Program Execution, System Development, Flowcharting, Introduction to C Language – Background, C Programs, Identifiers, Types, Variables, Constants, Coding Constants, Formatted Input / Output. **(Text Book 1)**

Learning Outcomes : At the end of this Unit the student will be able
- To gain knowledge in the concepts of problem solving
- Identify the steps in Program development
- Learn number system.

UNIT II   10 Periods

Number systems-Binary, Decimal, Hexadecimal and Transformations, storing integers and floats.
Program – expressions, precedence and Associativity, Side effects, evaluating expressions, mixed type expressions, statements.
Selection –Making Decisions – Logical data and operators, Bitwise Operators- logical bitwise operators, shift operators, bitwise use, Two way selection, Multi way selection
Repetition – concept of a loop, pretest and posttest loops, initialization and updating, event controlled and counter controlled loops, loops in C, loop examples, other statements related to looping, looping applications **(Text Book 1)**

Learning Outcomes : At the end of this Unit the student will be able to
- Apply decision making in c programming for problem solving
- Apply controlled structures in c programming for problem solving

UNIT III   10 Periods

Arrays – Concepts, using arrays in C, array applications, linear search, and Bubble sort, two – dimensional arrays, multidimensional arrays .
Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions **(Text Book 1)**

Learning Outcomes : At the end of this Unit the student will be able to
- Implement different operations on arrays
- Use string functions
- Apply string manipulation operations for problem solving.

UNIT IV   10 Periods
Functions-Designing Structured Programs, Functions in C, user defined functions, standard library functions, scope, Recursion
Storage classes-auto, register, static, extern
Pointers – Pointer Applications – Arrays and Pointers, pointer arithmetic and arrays, passing an array to a function, understanding complex declarations, memory allocation functions, array of pointers, programming application selection sort. **(Text Book 1)**

Learning Outcome : At the end of this Unit the student will be able to
- Know what a pointer is
- How to modularize a program
- Parameter passing techniques
- Write a recursive functions

Derived Types Enumerated, Structure and Union Types – The Type Definition (typedef), Enumerated types, Structures, accessing structures, Complex structures, arrays of structures, structures and functions ,unions

Text Files – Concept of a file, files and streams, input / output functions, formatting input/output functions, character input/output functions, character input/output examples

Binary files – classification of files, using binary files, standard library functions for files, converting file type, file program examples.   **(Text Book 1)**

Learning Outcome : At the end of this Unit the student will be able to
- Write a structure and union
- Create and manage a file
- Use structure and union in files

Text Books:
 (1) **B. A. Forouzan and R. F. Gilberg** "*Cengage Learning , Computer Science: A Structured Programming Approach Using C*" Third Edition.
 (2) **Jeri R. Hanly , Elliot B .Koffman** , "*Problem solving and program Design in C*" , 7th Edition
 (3) **R.G.Dromey** , "*How to solve it by computer, Prentice-Hall International Series in Computer Science*" C.A.R. Hoare Series Editor

Reference Books:
 (1) *"An Introduction to Computer Science and problem solving"* - IT Department Material
 (2) **"Dietal & Deital"** , "*C How to Program 7/E*" ,PHI Publications
 (3) **Yashavant Kanetkar** , "*Let Us C"*, 16th Edition
 (4) **Brian W. Kernighan and Dennis M.Ritchie**, "*The C Programming Language"*, Prentice Hall of India

English Language lab

Course Code - Category: IT 116 – HS　　　　　　　　　　　　　**Credits:1.5**

L	T	P	E	O
0	0	3	0	1

Sessional Marks:50

End Exam: 3 Hours

End Exam Marks:50

Prerequisites:
Basic English language skills- LSRW at Intermediate Level

Course Objectives
1. To improve fluency in spoken English and to practice correct pronunciation.
2. To introduce the techniques of presentation skills
3. Help improve speaking skills through participation in activities such as role plays, discussions, and structured talks/ oral presentations

Course Outcomes

By the end of the course, the student will be able to:	
CO1	Speak English with proper pronunciation and intonation
CO2	Make effective oral presentations by interpreting and analysing data, pictures and videos and participate in Group Discussion on general topics
CO3	Make meaningful conversations and follow logical flow of thought; answer questions on key concepts after listening to extended passages.

CO PO Matrix

| CO | PO | | | | | | | | | | | | PSO | | |
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1		2								3		1			
CO2				2	2	2	2			3		1	1		
CO3										3		1	1		

Syllabus
Module- I
The sounds of English　CO1
1. Practicing correct Pronunciation through IPA, Stress, Intonation, Rhythm

Module –II
Group Discussions　CO2
1. Purpose, Different roles for participants, Etiquette in a structured GD - Practice GDs

Module –III
Interpersonal Skills CO3 (Role plays)
1. Introduction of self and others, making announcements
2. Getting Someone's Attention, and Interrupting Conversations
3. Making Requests and Responding to them, asking for directions

Module –IV
Listening Skills　CO3
1. Listening to unknown passages – for global understanding, identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Module –V
Presentation skills CO2
1. Oral Presentations (JAMs) 2. Describing and analysing videos and pictures.3. Interpreting and analysing data from graphs and charts

Prescribed book:
Oriental Black Swan. "*Language and Life*" 1st edition, 2018 Board of Editors. .

Reference Books:
1. **J.K. Gangal.** "*A Practical Course in Effective English Speaking Skills*". Prentice Hall India Learning Private Limited 2012.

Problem Solving with 'C'Lab

(Common to all branches)

Course Code - Category: IT 117 - ES   **Credits:1.5**

L	T	P	E	O
0	0	3	0	3

Sessional Marks:50

End Exam: 3 Hours   End Exam Marks:50

Prerequisite: Concepts of Problem Solving & Computer Programming in C

CourseObjective:
- The course aims at translating given algorithms to a working and valid program

CourseOutcomes:

Aftercompletionofthis course,astudentwillbeableto:	
CO1	Develop C programs using operators
CO2	Write C programs using conditional structures
CO3	Write C programs using iterative structure arrays and strings
CO4	Inscribe C programs that use Pointers toand functions
CO5	Develop a c program for implementing user defined types and file processing

PROGRAMMING WITH C LABCO PO Matrix														
	P01	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P10**	**P11**	**P12**	**PSO1**	**PSO2**
CO1	3	3	2	3		1	1	1	2	1		1	2	2
CO2	1	2	2	2	1								2	1
CO3	2	1	2	1	2								3	2
CO4	2	3	2	2	2	2	2	2	3	3	2	2	3	3
CO5	2	1	2	1	2								3	2

SYLLABUS

MINIMUM SET OF SAMPLE PROGRAMS

1. CONVERTING MILES TO KILOMETERS

PROBLEMSTATEMENT: Your summer surveying job requires you to study some maps that give distances in kilometers and some that use miles. You and your coworkers prefer to deal in metricmeasurements. Write a program that performs the necessary conversion.

Problem Input: miles /* the distance in miles*/
Problem Output: kms /* the distance in kilometers */

Relevant Formula: *1 mile = 1.609 kilometers*

Design algorithm , flow chart ,program using the above data requirements for the given problem.
Try the sample test cases given below :

SAMPLE TEST CASES	INPUT	OUPUT
Test case 1	10	16.09
Test case 2	2	3.218

2. SUPERMARKET COIN PROCESSOR

PROBLEM STATEMENT : You are drafting software for the machines placed at the front of supermarkets to convert change to personalized credit slips. In this draft, the user will manuallyenter the number of each kind of coin in the collection, but in the final version,these counts will be provided by code that interfaces with the counting devices inthe machine.

Problem Inputs
char first, middle, last /* a customer's initials */
int dollars   /* number of dollars   */
int quarters   /* number of quarters   */
int dimes   /* number of dimes   */
int nickels   /* number of nickels   */
int pennies   /* number of pennies   */
Problem Outputs
inttotal_dollars   /* total dollar value   */
int change   /* leftover change   */
Additional Program Variables
inttotal_cents   /* total value in cents */

Design algorithm, flow chart ,program using the above data requirements for the given problem Try the sample test cases given below :

TESTING TIP :

To test this program, try running it with a combination of coins that yield an exactdollar amount with no leftover change. For example, 1 dollar, 8 quarters, 0 dimes,35 nickels, and 25 pennies should yield a value of 5 dollars and 0 cents. Thenincrease and decrease the quantity of pennies by 1 (26 and 24 pennies) to make surethat these cases are also handled properly.

SAMPLE TEST CASES	INPUT	OUPUT

Test case 1	Type in your 3 initials and press return> JRH	JRH Coin Credit
	JRH, please enter your coin information.	Dollars: 9
	Number of $ coins > 2	Change: 26
	Number of quarters> 14	cents
	Number of dimes > 12	
	Number of nickels > 25	
	Number of pennies > 131	
Test case 2	Type in your 3 initials and press return> JRH	JRH Coin Credit
	JRH, please enter your coin information.	Dollars: 11
	Number of $ coins > 3	Change: 26
	Number of quarters> 12	cents
	Number of dimes > 14	
	Number of nickels > 50	
	Number of pennies > 175	

3.WATER BILL PROBLEM

PROBLEM STATEMENT : Write a program that computes a customer's water bill. The bill includes a $35 water demand charge plus a consumption (use) charge of $1.10 for every thousand gallonsused. Consumption is figured from meter readings (in thousands of gallons) takenrecently and at the end of the previous quarter. If the customer's unpaid balance isgreater than zero, a $2 late charge is assessedas well.

Problem Constants
DEMAND_CHG 35.00   /* basic water demand charge   */
PER_1000_CHG 1.10   /* charge per thousandgallons used   */
LATE_CHG 2.00   /* surcharge on an unpaid balance   */
Problem Inputs
int previous /* meter reading from previous quarter in thousands of gallons   */
int current   /* meter reading from current quarter   */
double unpaid /* unpaid balance of previous bill   */
Problem Outputs
double bill   /* water bill   */
doubleuse_charge /* charge for actual water use   */
doublelate_charge /* charge for nonpayment of part   ofprevious balance   */
Relevant Formulas
water bill = demand charge + use charge + unpaid balance+ applicable late charge

Design algorithm , flow chart ,program using the above data requirements for the given problem Try the sample test cases given below :

SAMPLE TEST CASES	INPUT	OUPUT

Test case 1	This program figures a water bill based on the demand charge ($35.00) and a $1.10 per 1000 gallons use charge. A $2.00 surcharge is added to accounts with an unpaid balance. Enter unpaid balance, previous and current meter readings on separate lines after the prompts. Press <return> or <enter> after typing each number. Enter unpaid balance> $71.50 Enter previous meter reading> 4198 Enter current meter reading> 4238	Bill includes $2.00 late charge on unpaid balance of $71.50 Total due = $152.50
Test case 2	This program figures a water bill based on the demand charge ($35.00) and a $1.10 per 1000 gallons use charge.	Bill includes $2.00 late charge on unpaid balance of $71.50 Total due = $102.00
	A $2.00 surcharge is added to accounts with an unpaid balance. Enter unpaid balance, previous and current meter readings on separate lines after the prompts. Press <return> or <enter> after typing each number. Enter unpaid balance> $51 Enter previous meter reading> 4198 Enter current meter reading> 4137	

4. PRIME NUMBER

PROBLEM STATEMENT : Given a positive integer **N**, calculate the sum of all prime numbers between **1** and **N** (inclusive).
Input:
The first line of input contains an integer **T** denoting the number of test cases. T testcases follow. Each testcase contains one line of input containing **N**.

Output:
For each testcase, in a new line, print the sum of all prime numbers between 1 and N.

Constraints:
$1 \le T \le 100$
$1 \le N \le 10^6$

Design algorithm , flow chart ,program using the above data requirements for the given problem Try the sample test cases given below :

SAMPLE TEST CASES	INPUT	OUPUT
Test case 1	2 5 10	10 17

4

Test case 2		2 7 10	17 17

5. BUBBLE SORT

PROBLEM STATEMENT : The task is to complete bubble function which is used to implement Bubble Sort
Input:
First line of the input denotes the number of test cases 'T'. First line of the test case is the size of array and second line consists of array elements.

Output:
Sorted array in increasing order is displayed to the user.

Constraints:
1 <=T<= 100
1 <=N<= 1000
1 <=arr[i]<= 1000

Design algorithm , flow chart ,program using the above data requirements for the given problem Try the sample test cases given below :

SAMPLE TEST CASES	INPUT	OUPUT
Test case 1	2 5 4 1 3 9 7 10 10 9 8 7 6 5 4 3 2 1	1 3 4 7 9 1 2 3 4 5 6 7 8 9 10
Test case 2	1 5 8 9 3 2 0	0 2 3 8 9

6. TEXT EDITOR

PROBLEM STATEMENT: Design and implement a program to perform editing operations on a line of text. Your editor should be able to locate a specified target substring, delete a substring,and insert a substring at a specified location. The editor should expect source stringsof less than 80 characters.

 Problem Constant MAX_LEN   100   /* maximum size of a string */
 Problem Inputs
char source[MAX_LEN]   /* source string */
char command   /* edit command */
Problem Output
char source[MAX_LEN] /* modified source string */

Design algorithm , flow chart ,program using the above data requirements for the given problem Try the sample test cases given below :

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SAMPLE TEST CASES	INPUT	OUPUT
Test case 1	Enter the source string: > Internet use is growing rapidly. Enter D(Delete), I(Insert), F(Find), or Q(Quit)> d String to delete> growing	New source: Internet use is rapidly
Test case 2	Enter D(Delete), I(Insert), F(Find), or Q(Quit)> F String to find>**.**	'.' found at position 23

7. ARITHMETIC WITH COMMON FRACTIONS

PROBLEM STATEMENT: You are working problems in which you must display your results as integer ratios; therefore, you need to be able to perform computations with common fractions and getresults that are common fractions in reduced form. You want to write a program thatwill allow you to add, subtract, multiply, and divide several pairs of common fractions.

Design algorithm, flow chart, program using the above data requirements for the given problem
Try the sample test cases given below :

SAMPLE TEST CASES	INPUT 1	OUPUT
Test case 1	Enter a common fraction as two integers separated by a slash> 3/-4	Input invalid—denominator must be positive
Test case 2	Enter a common fraction as two integers separated by a slash> 3/4 Enter an arithmetic operator (+,-,*, or /) > + Enter a common fraction as two integers separated by a slash> 5/8 Entering find_gcd with n1 = 44, n2 = 32 Do another problem? (y/n)>n	gcd of 44 and 32?> 4 find_gcd returning 4 3/4 + 5/8 = 11/8

8. FACTORIAL OF A NUMBER

PROBLEM STATEMENT: Find factorial of a given number n.

Design algorithm , flow chart ,program using the above data requirements for the given problem Try the sample test cases given below :

SAMPLE TEST CASES	INPUT 1	OUPUT
Test case 1	Enter a number to find factorial>2	Factorial of 2 is 4
Test case 2	Enter a number to find factorial>3	Factorial of 3 is 6

9. COLLECTING AREA FOR SOLAR-HEATED HOUSE – FILES AND FUNCTIONS

PROBLEM STATEMENT : An architect needs a program that can estimate the appropriate size for the collecting area of a solar-heated house. Determining collecting area size requiresconsideration of several factors, including the average number of heating degreedays for the coldest month of a year (the product of the average difference

betweeninside and outside temperatures and the number of days in the month), the heating requirement per square foot of floor space, the floor space, and the efficiency ofthe collection method. The program will have access to two data files. File hdd.txtcontains numbers representing the average heating degree days in the constructionlocation for each of 12 months. File solar.txt contains the average solar insolation(rate in BTU/day at which solar radiation falls on one square foot of a given location)for each month. The first entry in each file represents data for January, the second,data for February, and so on.

Problem Inputs
Average heating degree days file
Average solar insolation file
heat_deg_days /* average heating degree days for coldest month   */
coldest_mon   /* coldest month (number 1 .. 12)   */
solar_insol   /* average daily solar insolation (BTU/ft^2)for   coldest month   */
heating_req /* BTU/degree day ft^2 for planned type construction*/
efficiency /* % of solar insolation converted to usable heat */
floor_space /* square feet */
Program Variables
energy_resrc /* usable solar energy available in coldest month (BTUs obtained from 1 ft^2 of collecting area) */
Problem Outputs
heat_loss   /* BTUs of heat lost by structure in coldest month */
collect_area /* approximate size (ft^2) of collecting area needed*/

The formula for approximating the desired collecting area (A) is :
A= heat loss / energy resource

Design algorithm , flow chart ,program using the above data requirements for the given problem
Try the sample test cases given below :

SAMPLE TEST CASES	INPUT	OUPUT

Test case 1	What is the approximate heating requirement (BTU / degree day ft^2) of this type of construction?
	  =>9
	 What percent of solar insolation will be converted to usable heat?
	  => 60
	What is the floor space (ft^2)?
	  => 1200
		To replace heat loss of 11350800 BTU in the coldest month (month 12) with available solar insolation of 500 BTU / ft^2 / day, and an efficiency of 60 percent, use a solar collecting area of 1221 ft^2.

Test case 2	What is the approximate heating requirement (BTU / degree day ft^2) of this type of construction?
	  =>10
	 What percent of solar insolation will be converted to usable heat?
	  => 60
	What is the floor space (ft^2)?
	  => 1200
		To replace heat loss of 12612000 BTU in the coldest month (month 12) with available solar insolation of 500 BTU / ft^2 / day, and an efficiency of 60 percent, use a solar collecting area of 1221 ft^2.

Q10. UNIVERSAL MEASUREMENT CONVERSION

PROBLEM STATEMENT: Design a program that takes a measurement in one unit (e.g., 4.5 quarts) and converts it to another unit (e.g., liters). For example, this conversion request 450 km miles would result in this program output Attempting conversion of 450.0000 km to miles . . . 450.0000km = 279.6247 miles . The program should produce an error message if a conversion between two unitsof different classes (e.g., liquid volume to distance) is requested. The programshould take a database of conversion information from an input file before acceptingconversion problems entered interactively by the user. The user should be able tospecify units either by name (e.g., kilograms) or by abbreviation (e.g., kg).

Structured Data Type
unit_tmembers :
name   /* character string such as "milligrams"   */
abbrev   /* shorter character string such as "mg"   */
class   /* character string "liquid_volume", "distance", or "mass" */
standard /* number of standard units that are equivalent to this unit */
Problem Constants
 NAME_LEN   30 /* storage allocated for a unit name   */
 ABBREV_LEN   15 /* storage allocated for a unit abbreviation */
 CLASS_LEN   20 /* storage allocated for a   measurement class   */
 MAX_UNITS   20 /* maximum number of different units   handled   */
 Problem Inputs
unit_t units[MAX_UNITS] /* array representing unit conversion factors database   */
double quantity   /* value to convert   */
charold_units[NAME_LEN] /* name or abbreviation of units to be converted   */
charnew_units[NAME_LEN] /* name or abbreviation of units to convert to   */
Problem Output
Message giving conversion.

Data file **units.txt:**
miles   mi   distance   1609.3
kilometers   km   distance   1000
yards   yd   distance   0.9144
meters   m   distance   1
quartsqtliquid_volume 0.94635
liters   l   liquid_volume 1
gallons   gal   liquid_volume 3.7854
milliliters   ml   liquid_volume 0.001
kilograms   kg   mass   1
grams   g   mass   0.001
slugsslugs   mass   0.14594
poundslb   mass   0.43592

Design algorithm , flow chart ,program using the above data requirements for the given problem

Try the sample test cases given below :

SAMPLE TEST CASES	INPUT 1	OUPUT
Test case 1	Enter a conversion problem or q to quit. To convert 25 kilometers to miles, you would enter > 25 kilometers miles or, alternatively, > 25 km mi	>450 km miles Attempting conversion of 450.0000 km to miles . . . 450.0000km = 279.6247 miles
Test case 2	Enter a conversion problem or q to quit. > 2.5 qt l Attempting conversion of 2.5000 qt to l . . . 2.5000qt = 2.3659 l Enter a conversion problem or q to quit.	> 100 meters gallons Attempting conversion of 100.0000 meters to gallons . . . Cannot convert meters (distance) to gallons (liquid_volume)

ADDITIONAL PROGRAMS

Problem solving programs:

1. **Chocolate feast :** Little Bob loves chocolates, and goes to a store with $N in his pocket. The price of each chocolate is $C. The store offers a discount: for every M wrappers he gives to the store, he gets one chocolate for free. How many chocolates does Bob get to eat? Note : Evaluate the number of wraps after each step. Do this until you have enough wraps to buy new chocolates.

2. **Angry Professor :**The professor is. Given the arrival time of each student, your task is to find out if the class gets cancelled or conducting a course on Discrete Mathematics to a class of N students. He is angry at the lack of their discipline, and he decides to cancel the class if there are less than K students present after the class startsnot.

3. **Divisible Sum Pairs :** You are given an array of n integers and a positive integer, k. Find and print the number of (i,j) pairs where i< j and $a_i + a_j$ is evenly divisible by k.

4. **Sherlock And Valid String:** A "valid" string is a string S such that for all distinct characters in S each such character occurs the same number of times in S. Note :The logic of the solution is as follows: count the character counts for each character. Note : if they are all equal – it means that all characters occur exactly N times and there is no removal needed .if 2 or more have less or more characters – there is no way to fix the string in just 1 removal . if exactly 1 char has a different count than all other characters – remove this char completely and S is fixed.

5. **Ice Cream Parlor :**Sunny and Johnny together have M dollars they want to spend on ice cream. The parlor offers N flavors, and they want to choose two flavors so that they end up spending the whole amount. You are given the cost of these flavors. The cost of the ith flavor is denoted by c_i. You have to display the indices of the two flavors whose sum is M.

6. **'Missing Numbers' :**Numeros, the Artist, had two lists A and B, such that B was a permutation of A. Numeros was very proud of these lists. Unfortunately, while transporting

them from one exhibition to another, some numbers from A got left out. Can you find the numbers missing?

7. **Alternating Characters:** John likes strings in which consecutive characters are different. For example, he likes ABABA, while he doesn't like ABAA. Given a string containing characters A and B only, he wants to change it into a string he likes. To do this, he is allowed to delete the characters in the string.

8. **Game Of Thrones :** I : Dothraki are planning an attack to usurp King Robert's throne. King Robert learns of this conspiracy from Raven and plans to lock the single door through which the enemy can enter his kingdom door. But, to lock the door he needs a key that is an anagram of a palindrome. He starts to go through his box of strings, checking to see if they can be rearranged into a palindrome.For example, given the string ,s=[aabbccdd] one way it can be arranged into a palindrome is abcddcba .

9. **Life and everything :** Your program is to use the brute-force approach in order to find the Answer to Life, the Universe, and Everything. More precisely... rewrite small numbers from input to output. Stop processing input after reading in the number 42. All numbers at input are integers of one or two digits.
input: 1 2 23 22 42
output: 1 2 23 22

10. **Filling Jars :**Animesh has N empty candy jars, numbered from 1 to N, with infinite capacity. He performs M operations. Each operation is described by 3 integers a, b and k. Here, a and b are indices of the jars, and k is the number of candies to be added inside each jar whose index lies betweena and b (both inclusive). Can you tell the average number of candies after M operations?

Reference Books:

(1) Jeri R. Hanly , Elliot B .Koffman , Problem solving and program Design in C , 7th Edition
(2) Computer Science: A Structured Programming Approach Using C, B. A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
(3) Dietal&Deital , C How to Program 7/E ,PHI Publications

Web References :

- https://www.spoj.com/
- https://projecteuler.net/
- https://www.hackerearth.com/practice/
- https://www.codechef.com/
- https://onlinecourses.nptel.ac.in/

Instructions to the instructor:

This lab course consists of two set of programs
1) Minimum set of sample programs
2) Additional set of programs

Minimum set of sample programs are designed unit wise covering all the topics in the theory .
Additional set of programs are designed basing on problem solving

<u>Sessional marks : 50 marks</u>

1) Daily Evaluation (Includes Record, Observation & regular performance) – 30 marks
2) Attendance – 5 marks
3) Internal Exam – 10 marks
4) Viva Voce – 5 marks

<u>Daily Evaluation (30 marks)</u>

- Every Student must execute minimum set of sample programs to secure 60% of marks in Daily Evaluation i.e. 18 Marks and to appear in external examination.
- In addition to that if a student finishes the minimum set and 5 programs from additional set of programs would secure 80% of marks in Daily Evaluation i.e. 24 Marks.
- If a student finishes all the programs in both the set s will secure 100% of marks in Daily Evaluation

<u>Internal Exam (10 marks)</u>

- Every student is given 4 questions in the internal exam out of which the difficulty level of 2 questions is easy / medium and 2 questions of difficulty level is high
- Each easy / medium level question carries 20% of marks and difficulty level question carries 30% of marks

<u>External Exam (50 marks)</u>

- Viva voce – 10 marks
- Write up + Execution – 40 marks

<u>Write up + Execution (40 marks)</u>

- Every student is given 4 questions in the external exam out of which the difficulty level of 2 questions is easy / medium and 2 questions of difficulty level is high
- Each easy / medium level question carries 30% of marks and difficulty level question carries 20% of marks.

ENVIRONMENTAL SCIENCE
Mandatory (Non Credit) course for all branches

Course Code - Category: IT 118 - MC   **Credits:0**

L	T	P	E	O	Sessional Marks:50
3	0	0	0	1	

COURSE OBJECTIVE:
- ➢ To Make the students get awareness on environment
- ➢ To understand the importance of protecting natural resources, ecosystems for future generations
- ➢ To know about the causes of pollution due to the day to day activities of human life
- ➢ To get an idea about the measures for sustainable development

Course Outcomes:

By the end of the semester, the student will be able to:
CO1 Identify the characteristics of various natural resources and can implement the conservation practices
CO2 Realize the importance of Ecosystem and Biodiversity for maintaining ecological balance
CO3 Classify, analyze various pollutants and can develop methods for solving problems related to environment
CO4 Get awareness on various environmental laws and methods for sustainable development of environment
CO5 Understand the impact of population growth on human health and environment

CO PO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						1	2	1		1		1		
CO2						1	2	1		1		1		
CO3						2	2	1		1		1		
CO4						2	3	1		1		1		
CO5						2	2	1	3	2		1		

SYLLABUS
UNIT I
INTRODUCTION TO ENVIRONMENT AND NATURAL RESOURCES   8 Periods
Introduction: Definition, Multidisciplinary nature of environmental studies, Scope and Importance of Environmental Sciences, Need for public awareness.
Natural Resources: Renewable and Non-Renewable resources- Forest resources-use and overexploitation, deforestation, Water resources- aquifers, dams and benefits, conflicts over water; Food resources- effects of modern agriculture practices, Energy resources-conventional and non conventional energy resources.

LEARNING OUTCOMES
- Students will be able to know the scope and importance of environment.
- Students will be able to explain natural resources and their associated problems.
- Students will be able to articulate basic understanding of effects of modern agriculture practices on environment.
- Students will be able to recognise the importance of alternative sources of energy.

UNIT- II
ECOSYSTEM & BIO DIVERSITY   8 Periods
Ecosystem: Concept of an ecosystem-structure and function of an ecosystem Food chains, food webs and ecological pyramids, Energy flow in an ecosystem, Ecosystem regulation, Ecological succession.
Biodiversity: Definition, types, India as a Mega diversity Nation, Values of biodiversity, Hot spots of biodiversity, Threats to biodiversity, Endangered and endemic species, Conservation of biodiversity.

LEARNING OUTCOMES

- Students will get a clear picture on structure and functions of ecosystems.
- Students will be able to explain the energy and matter flow in ecosytems.
- Students will be able to identify the threats to biodiversity and conservation methods to protect biodiversity.
- Students will be able to understand the importance of endemic species.

UNIT -III
ENVIRONMETAL POLLUTION AND WASTE MANAGEMENT   8 Periods

Pollution: Sources, effects and control measures of Air pollution, Noise Pollution, Water Pollution, Soil Pollution, Radio Active Pollution; Climate Change, Ozone depletion, Acid rains –causes and adverse effects.
Solid waste management: Sources and effects of municipal waste, bio-medical waste, Industrial waste, e-waste, Process of waste management-composting, sanitary landfills, incineration. Green Chemistry concepts,

LEARNING OUTCOMES

- Students will be able to understand sources, effects and control measures of various types of pollutions.
- Students will be able to understand about solid waste management.
- Students will explain the ill effects of climatic change.

UNIT- IV

SOCIAL ISSUES AND ENVIRONMENTAL LEGISLATIONS   **8 Periods**
Social Issues and the Environment: Sustainable development, Environmental Impact Assessment, Rain water harvesting, water shed management. Resettlement and rehabilitation of people, Environmental ethics.
Legislational Acts: Importance of Environmental legislation, Air (Prevention and Control of Pollution) act, Water (Prevention and control of Pollution) act, Wildlife Protection act, Forest Conservation act

LEARNING OUTCOMES

- Students will be able to know the mesures to achieve sustainable development.
- Students will have knowledge about watershed management and environmental ethics
- Students will be able to explain the enforcement of Environmental legislations.

UNIT- V
HUMAN POPULATION AND THE ENVIRONMENT   **5 Periods**
Human population and environment- Population growth, Population explosion; Family Welfare Programmes; Role of information technology on environment and human health; Value Education – HIV/AIDS – Women and Child Welfare
FIELD WORK/PROJECT: Visit to a local area to document environmental problem;

LEARNING OUTCOMES

- Students will know the impacts of population on human health and environment.
- Students will understand the role of IT on Environment.
- Students will be able to prepare a detailed report on a particular environmental issue.

AWARENESS AND OTHER ACTIVITIES
1. Planting trees
2. Listing out water bodies and discuss the problems associated with it
3. Poster making of ecological pyramids and food chain and food web of different ecosystems like forest, grassland and aquatic system
4. Prepare list of endangered endemic and extinct species
5. Preparation of models
6. Cleanliness drive (Swatch Bharath)
7. Group discussion about waste management
8. Slogan making

Prescribed Book
1. **Anubha Kaushik & C.P.Kaushik**, "*Perspertives of Environmental Studies*" by 5th edition New Age International Publications, 2015.
2. **Erach Bharucha** *Text book of "Environmental Studies for Undergraduate Courses*", universities Press Commission, 2013.
3. **Palaniswamy**- "*Environmental Studies*", 2nd edition, Pearson education 2015.

Reference Books
1. **S. Deswal, A. Deswal**, "*Basic course in Environmental studies*", 2nd edition, Dhanpatrai Publications, 2008.

ENGINEERING MATHEMATICS-I
MATRIX ALGEBRA & MULTIVARIABLE CALCULUS
Common to all branches

Course Code - Category: IT 111 - BS   **Credits:3**

L	T	P	E	O
3	0	0	1	6

Sessional Marks:40

End Exam: 3 Hours

End Exam Marks:60

Course Objective:
To provide the students with sufficient knowledge in calculus and matrix algebra, this can be used in their respective fields.

Course outcomes:

By the end of the semester, the student will be able to:	
CO1	Apply elementary transformations to reduce the matrix into the echelon form and normal form to determine its rank and interpret the various solutions of system of linear equations
CO2	Identify the special properties of a matrix such as the eigen value, eigen vector, employ orthogonal transformations to express the matrix into diagonal form, quadratic form and canonical form
CO3	Equip themselves familiar with the functions of several variables and mean value theorems
CO4	Evaluatedoubleandtripleintegraltechniquesoveraregionintwodimensionalandthree dimensional geometry
CO5	Familiarize with special functions to evaluate some proper and improper integrals using beta and gamma functions

CO PO Matrix

		PO												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO	1	3	2										1	1	
	2	3	2										1	1	
	3	3	2										1	1	
	4	3	2										1	1	
	5	3	2										1	1	

SYLLABUS

Unit - I: Linear Equations   10 Periods

Rank of matrix, normal form of a matrix, PAQ form, Gauss Jordan Method of finding the inverse, consistency of linear system of equations.

Learning outcome: At the end of this unit student will be able to

- Solve the system of equations using the rank.

Unit - II: Linear transformations and Quadratic forms   14 Periods

Linear transformations, orthogonal transformations, vectors (linearly independent & dependent), eigen values, eigen vectors, properties of eigen values, Cayley - Hamilton theorem (without proof), reduction to diagonal form, reduction of Quadratic form to Canonical form, nature of the Quadratic form.

Learning outcome: At the end of this unit, student will be able to

- Identify the special properties of a matrix such as the eigen values, eigen vectors, diagonal form and nature of the quadratic forms.

Unit - III: Single and Multivariable Calculus   12 Periods

Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem (All theorems without proof). Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, Taylor's series expansion of two variable function, maxima and minima of functions of two variables, method of Lagrange's multipliers.

Learning outcome: At the end of the unit, student will be able to
- Analyze the behavior of functions by using mean value theorems.
- Estimate the maxima and minima of multivariable functions.

Unit - IV: Multiple Integrals   14 Periods

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves, evaluation of triple integrals, volumes of solids, change of variables between cartesia cylindrical and spherical polar coordinates, calculation of mass, center of gravity.

Learning outcome: At the end of the unit, the student will be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates.

- Apply double and triple integration techniques in evaluating areas and volumes bounded by a region.

Unit - V: Special functions   10 Periods

Beta and Gamma functions and their properties, relation between Beta and Gamma functions, evaluation of double and triple integrals by using Beta and Gamma functions, error function.

Learning outcome: At the end of this unit, the student will be able to

- conclude the use of special functions in multiple integrals.

Textbooks:

1. **B. S. Grewal**, "*Higher Engineering Mathematics*", 44/e, Khanna Publishers, 2017.

2. **Erwin Kreyszig**, "*Advanced Engineering Mathematics*", 10/e, John Wiley& Sons, 2011.

References:

1. **N. P. Bali**, "*Engineering Mathematics*", Lakshmi Publications.

2. **George B. Thomas, Maurice D. Weir and Joel Hass**, "*Thomas Calculus*", 13/e, Pearson Publishers, 2013.

3. **H. K. Dass**, "Advanced Engineering Mathematics", S. Chand and complany Pvt. Ltd.

4. **Michael Greenberg**, "*Advanced Engineering Mathematics*", Pearson, Second Edition.

COMMUNICATIVE ENGLISH
Common for all branches

Course Code - Category: IT 112 - HS   **Credits:3**

L	T	P	E	O
3	0	0	1	2

Sessionals marks:40
End marks:60

Prerequisites:
Basic English language skills- LSRW at (10+2) / Intermediate Level

Course Objectives
➢ To focus on appropriate reading strategies for comprehension of various forms of texts.
➢ To instruct effectives strategies for good writing and exhibit the same in writing well organized passages, reports and other forms of business communication
➢ Provide knowledge of grammatical structures and vocabulary to be used appropriately in their writing.

Course Outcomes

By the end of the course, the student will be able to:	
CO1	Comprehend, interpret and analyze text and answer questions based on passages.
CO2	Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal correspondence.
CO3	Construct grammatically correct sentences and apply proper vocabulary in speech and writing.

CO PO Matrix

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		1		2		1				3			1		
CO2										3					
CO3										3	1				

UNIT- I   **10 Periods**

 Reading: 1. Skimming and Scanning to get the main idea of a text and look for specific information
 -On the Conduct of Life: *William Hazlitt* 2. If- *Rudyard Kipling* –**CO1**
Writing: Paragraph writing (specific topics) using suitable cohesive devices – Unity, logical order, coherence, opening and closing statements. **CO2**
Grammar: Clauses and Sentences: Sentence structures, use of phrases and clauses in sentences **CO3**
Vocabulary: The concept of word formation, Acquaintance with prefixes and suffixes   **CO3**

UNIT –II   **10 Periods**

Reading: 1. Reading for inferential comprehension- The Brook: *Alfred Tennyson* 2. How I Became a Public Speaker: *George Bernard Shaw* **CO1**

Writing: Formal letter writing. Letters of complaint, enquiry, report, invite, placing orders, acknowledgment and follow-up letters. **CO2**

Grammar: Punctuation: importance of proper punctuation in texts, Articles **CO3**

Vocabulary: Word building using foreign roots **CO3**

10 Periods

UNIT –III

Reading: 1. Comprehend complex texts identifying the author's purpose-
The Death Trap: *Saki* 2. On Saving Time: *Seneca* **CO1**

Writing :: Reports (Structure and content of a project report) **CO2**

Grammar : Noun-Pronoun Agreement, Subject –Verb agreement, Tenses **CO3**

Vocabulary: Idiomatic expressions **CO3**

UNIT –IV **10 Periods**

Reading: 1. Identifying claims, evidences, views, opinions and stance/position.-
Chindu Yellama 2. Muhammad Yunus **CO1**

Writing Skills: 1. Writing structured essays (persuasive and argumentative) using suitable claims and evidences CO2

Grammar: Misplaced Modifiers, adjectives, adverbs **CO3**

Vocabulary: Synonyms & Antonyms **CO3**

UNIT –V **12 Periods**

Reading: Developing advanced reading skills for deeper understanding of the text
Politics and the English Language: *George Orwell* 2.The Dancer with a
White Parasol: *Ranjana Dave* **CO1**

Writing : Précis writing (Summarizing-identifying main idea and rephrasing the text), Applying for internship/Writing job applications: Resume and C.V with cover letter **CO2**

Grammar: Prepositions, correction of sentences. **CO3**

Vocabulary: Phrasal verbs **CO3**

Prescribed book:

Board of Editors "*Language and Life*" 1st edition, Oriental Black Swan 2018.

Reference Books:
1. **Sanjay Kumar and Pushpa lata** "*Communication skills*" Oxford University Press. 2011

2. **Meenakshi Raman and Sangeetha Sharma** "*Technical communication*" Oxford University Press.

3. *Kulbushan Kumar* "*Effective communication skills*" Khanna Publishing House, Delhi.

BASIC ELECTRONICS ENGINEERING

Course Code - Category: IT 113 - ES **Credits:3**

L	T	P	E	O
3	0	0	1	6

Sessional Marks:40

End Exam Marks:60

End Exam: 3 Hours

Prerequisites: Nil

Course Outcomes:

After completion of the course the student will be able to	
CO1	Understand the behavior of PN diode under different biasing conditions.
CO2	Calculate the efficiency and ripple factor of half wave, Full wave center tapped and
CO3	Obtain input and output characteristics of BJT in different configurations and identify the region of operation of transistor
CO4	Design the transistor biasing and compensation circuits for better stability
CO5	Device the characteristics of FET/MOSFET in different modes

CO PO Matrix

		PO												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO	1	2	2											-	-
	2	2	1											-	-
	3	1	1											-	-
	4	1	1											-	-
	5	2	2											-	-

SYLLABUS

Unit-I: Semiconductor diodes   9 periods

Intrinsic Semiconductors, Fermi energy level, Mass action law, Extrinsic semiconductors, Conductivity of semiconductor materials, Diffusion current, Drift current, Mean life time and diffusion length of charge carriers, Hall effect, Unbiased PN Junction, Energy levels of PN Junction diode, PN Junction diode Forward and reverse biases, Diode current equation, Junction capacitances, Avalanche and Zener Break down, Varactor diode and Photo diode.

Unit-II: Rectifiers and Filters   9 periods

Half wave rectifier, Full wave center tapped and Bridge rectifiers, Rectifier- DC components, AC Components, Ripple factor, Transformer Utilization factor, Efficiency, PIV, and Regulation

Filters: Inductor, Capacitor, LC, CLC filters, Ripple factor

Unit-III: Transistor Characteristics   **9 periods**

Common Base, Common Emitter, Common Collector Configurations, Transistor current components, Input and Output Characteristics, Punch through effect, Active region, Saturation region, Cutoff region, Transistor as switch.

Unit-IV: Transistor biasing and Stabilization   **9 periods**

Biasing of transistor, DC load line, Operating point, fixed bias, Collector –Base bias, Self bias or Voltage divider bias, Diode Compensation, Thermistor compensation, Sensistor Compensation, Small signal CE amplifier.

Unit-V: FET/MOSFET Characteristics   **9 periods**

Classification of FET, Construction of n-JFET and p-JFET, Transfer and Drain characteristics, Construction of MOSFET, Characteristics of enhancement and depletion mode MOSFETs, Common source FET amplifier.

Text Books:

1. **R.L.Boylestad**, "*Electronic Devices and Circuit theory*", Pearson Education India, 2015.
2. **Jacob Millman, Christos halkias, Chetan D Prakash** " *Millman's Integrated Electronics*"- Tata McGraw-Hill, 2012

Reference Books:

1. **David A Bell** "*Electronic Devices and Circuits*" -; Oxford
2. **K Venkata Rao, K Rama** "*Sudha Electronic Devices and Circuits*" –; McGraw Hill Education – 2015
3. **Jacob Millman, Arvin Grabel** "*Micro Electronics"* –; Tata McGraw-Hill