GIRIJANANDA CHOWDHURY UNIVERSITY, ASSAM
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Semester IV

Theory/ Practical	Sl. No	Course Type	Course Code	Course Name	Hours per week			Credit	Mark	
					L	T	P	C	CA	FA
T	1.	PCC	BEC23201T	Analog Circuits	2	1	0	3	40	60
T	2.	PCC	BEC23202T	Microprocessor	3	0	0	3	40	60
T	3.	PCC	BEC23203T	Analog Communication	2	1	0	3	40	60
T	4.	PCC	BEC23204T	Advanced Programming Language	3	0	0	3	40	60
T	5.	PCC	BEC23205T	Power Electronics	2	1	0	3	40	60
P	6.	PCC	BEC23201P	Analog Circuits Lab	0	0	2	1	50	50
P	7.	PCC	BEC23202P	Microprocessor Lab	0	0	2	1	50	50
P	8.	PCC	BEC23203P	Analog Communication Lab	0	0	2	1	50	50
P	9.	PCC	BEC23204P	Advanced Programming Language Lab	0	0	2	1	50	50
P	10.	ESC	BEC232O5T	IoT / Robotics - Micro Project	0	0	2	1	50	50
T	11	HSMC		Slot for Life Skills/Languages English for technical writing	2	0	0	1	40	60
				Total	**14**	**3**	**10**	**21**	**490**	**610**

GIRIJANANDA CHOWDHURY UNIVERSITY, ASSAM
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BEC23201T	**Analog Circuits (4th semester)**	**3L:0T:0P**	**3 Credits**

Pre-requisites: Basics on current and voltage calculations

Course outcomes:
At the end of this course students will demonstrate the ability to
CO 1 ***Define different circuit configuration of different devices for various applications.(Remembering)***
CO 2 ***Develop circuits by using appropriate device models(Applying)***
CO 3 ***Build various analog circuits required in electronic systems. (Applying)***
CO 4 ***Illustrate mixed circuits such as ADC and DACs (Understanding)***

Course Contents:

MODULE	*CONTENT*	*No.of Classes*
MODULE 1	*Diode Circuits, Amplifier models: Voltage amplifier, current amplifier, trans-conductanceamplifier and trans-resistance amplifier. Biasing schemes for BJT and FET amplifiers, biasstability, various configurations and their features, smallsignal analysis, low frequency transistor models, estimation of voltage gain, input,andoutput resistance*	*8*
MODULE 2	*Various classes of operation (Class A, B, AB, C etc.), theirpower efficiency and linearity issues. Feedback topologies: Voltage series, current series,voltage shunt, current shunt, effect of feedback on gain and bandwidth.*	*8*
MODULE 3	*Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift,Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators.*	*6*
MODULE 4	*Current mirror: Basic topology and its variants, V-I characteristics, output resistance andminimum sustainable voltage (VON), maximum usable load. Differential amplifier: Basicstructure and principle of operation, calculation of differential gain, common mode gain,CMRR and ICMR*	*10*
MODULE 5	*Introduction to OP-AMP and its design: design of differential amplifier for a given specification,design of gain stages and output stages, compensation. Introduction to Digital-to-analog converters (DAC) and Analog-to-digital converters (ADC)*	*8*

Text /Reference Books

1. *A.V.N. Tilak, Design of Analog Circuits, Khanna Publishing House, 2022.*
2. *J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.*
3. *P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.*
4. *A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, Edition IV*
5. *Paul R.Gray& Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley,3rd Edition*

GIRIJANANDA CHOWDHURY UNIVERSITY, ASSAM
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BEC23202T	MICROPROCESSOR	**3L:0T:0P**	**3 Credits**

Pre-requisites: Number System, Digital Electronics

Course outcomes:
At the end of this course students will demonstrate the ability to
CO1: Explain the architecture of 8085 Microprocessor and some advanced processors (Understanding)
CO2: Apply assembly language for programming of 8085 Microprocessor (Apply)
CO3: Analyze suitable interfacing of peripherals with 8085 microprocessor (Analyzing)

Contents:

MODULE	***CONTENT***	***No. of Classes***
MODULE 1	Architectureof Microprocessors General processor architecture, 8085 architectures – Internal registers and System bus structure, Pin diagram of 8085.	***8***
MODULE 2	8085 instruction format and classification, addressing modes; Assembly language programming of 8085, Programlooping, counter, subroutine & linkages, delay routine. Instructioncycle, Machine cycle and T–state, Bus Timing diagra m. Stack and subroutine, stack used by the microprocessor during CALL and RET instructions, stack used by the programmer, 8085 interrupt process, software and hardware interrupts, their priorities, concepts ofDirect Memory Access.	***12***
MODULE 3	Memory classification and interfacing, Memory–map, Address decoding (Absolute and partial); interfacing of I/O devices, peripheral I/O and memory mapped I/O.	***7***
MODULE 4	Study of Programmable Interfacing devices like 8255, 8254, 8257, 8279 and their applications.Interfacing of LED and switches, matrix keyboardand multiplexed displays.	***10***
MODULE 5	AdvancedProcessor Concepts of virtual memory, Cache memory, Advanced coprocessor Architectures-286, 486, Pentium	***8***

Text /Reference Books

1. Microprocessor Architecture, Programming and Applications with 8085/8080A – Ramesh S. Gaonkar, Wiley Eastern Limited.
2. Fundamentals of Microprocessor and Microcomputers--B.RAM, DhanpatRai Pub.
3. The Intel Microprocessors 8086/8080,186/286,386,486,Pentium and Pentium Pro Processor Architecture. Programming and Interfacing--Barry R. Brey, PHI.

GIRIJANANDA CHOWDHURY UNIVERSITY, ASSAM
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BEC23203T	**ANALOG COMMUNICATION**	**L**	**T**	**P**	**C**
		3T	**0**	**0**	**3**

Pre-requisite: Signals and systems

Course Objectives: The objectives of this course are to:

1. To provide an overview of analog modulation schemes and effect of noise in communication systems to the students.
2. To provide some idea about receiver circuits used in analog communication to the students.

Course Outcome: After successful completion of this course, the students will be able to

CO1: Illustrate the principles of amplitude and angle modulation techniques
CO2: Analyze the behaviour of a communication system in presence of noise.
CO3: Investigate pulsed modulation system and analyze their system performance.
CO4:. Analyze the characteristics of receiver and different multiplexing schemes

Module 1:Introduction Review of signals and systems, Frequency domain of signals, Basic blocks of communication system, resources of communication, need of modulation.	**5hours**
Module 2 : Linear and Non Linear Modulation Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations, Generation and Detection, Angle Modulation, Relation and Representation of FM and PM signals, Basic block diagram representation of generation of FM and PM, VCO and reactance modulator, Pre-emphasis and De-emphasis, Slope detector, balanced slope detector, FM detection using PLL.	**14hours**
Module 3: Noise Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems,Threshold effect in angle modulation	**6hours**
Module 4: AM Receivers Concept of intermediate frequency, image frequency, local oscillator frequency, Receivers, Fixed tune recieversSuper-heterodyne receiver	**6hours**
Module 5: Pulse Modulation Sampling process, Pulse Amplitude Modulation(PAM), Pulse code modulation (PCM), Pulse Position Modulation (PPM)	**6hours**
Module 6: Multiplexing and access schemes Frequency and Time division multiplexing, FDMA,TDMA	**5hours**

Text Book(s)

1	B.P.Lathi, ZhiDing“Modern Digital and Analog Communication”, Oxford, 4 th Edition,2011
2	R. Anand, Communication Systems, Khanna Book Publishing Company, 2011.

Reference Book(s)

1	HaykinS.,"Communications Systems", John Wiley and Sons, 2001
2	Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002

GIRIJANANDA CHOWDHURY UNIVERSITY, ASSAM
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

		L	T	P	C
BEC23204T	**ADVANCED PROGRAMMING**	**3T**	**0**	**0**	**3**

Course outcomes:

At the end of this course students will demonstrate the ability to

CO1: Read, write, execute by hand simple Python programs.
CO2: Structure simple Python programs for solving problems.
CO3: Decompose a Python program into functions.
CO4: Represent compound data using Python lists, tuples, dictionaries.
CO5: Read and write data from/to files in Python Programs.

MODULE I: INTRODUCTION DATA, EXPRESSIONS, STATEMENTS (7 classes)

Introduction to Python and installation, data types: Int, float, Boolean, string, and list; variables, expressions, statements, precedence of operators, comments; modules, functions--- function and its use, flow of execution, parameters, and arguments.

MODULE II: CONTROL FLOW, LOOPS (7 classes)

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-else); Iteration: while, for, break, continue.

MODULE III: FUNCTIONS, ARRAYS (7 classes)

Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Python arrays, Access the Elements of an Array, array methods.

MODULE IV: LISTS, TUPLES, DICTIONARIES (7 classes)

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters, list comprehension; Tuples: tuple assignment, tuple as return value, tuple comprehension; Dictionaries: operations and methods, comprehension.

MODULE V: FILES, EXCEPTIONS, MODULES, PACKAGES (7 classes)

Files and exception: text files, reading and writing files, command line arguments, errors and exceptions, handling exceptions, modules (datetime, time, OS, calendar, math module), Explore packages.

Text Books/ References:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O 'Reilly Publishers, 2016.
2. R. Nageswara Rao, "Core Python Programming", Dreamtech.
3. Python Programming: A Modern Approach, VamsiKurama, Pearson.
4. Core Python Programming, W. Chun, Pearson.
5. Introduction to Python, Kenneth A. Lambert, Cengage
6. Learning Python, Mark Lutz, Orielly

GIRIJANANDA CHOWDHURY UNIVERSITY, ASSAM
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BEC23205T	POWER ELECTRONICS	**3 Credits**

Pre-requisites: Electronics Devices and Circuits

Course outcomes:

At the end of this course students will demonstrate the ability to

CO1: Learnhowto analyzeinvertersandsomebasic applications.
CO2: AnalyzeanddesignSMPS,controlledrectifiersDCtoDCconverters, DCtoACinverters.
CO3: LearnanddesignDCtoACinverters,Charge controllers
CO4: Analyze typical industrial application requirements and build a solution with commerciallyavailable power electronic devices.

Contents:

MODULE	*CONTENT*	*No. of Classes*
MODULE 1	**Characteristics of Semiconductor Power Devices** Thyristor- Structure, Characteristics, operation, ratings, protections and thermal considerations. Triggering/firing, commutationandsnubbercircuitsforthyristor. Brief introduction to power devices viz. TRIAC, MOS controlled thyristor (MCT), Power Integrated Circuit (PIC) (Smart Power), powerMOSFETsand IGBTs. Concept of fast recovery and schottky diodes as freewheeling and feedback diode.	*12*
MODULE 2	**ControlledRectifiers** Singlephase: Half and fullbridgeconvertersforR,RL,RLE andlevelloads. Analysisofloadvoltageandinputcurrent-Derivationsofloadformfactorand ripplefactor, Semi converters, effect of source impedance	*10*
MODULE 3	**Choppers** Basic chopper classification, Quadrant operations of Type A, Type B, Type C, Type D and type E choppers, Control techniques for choppers – TRC and CLC, Multiphase Chopper	*6*
MODULE 4	**Single-phaseinverters** Principleofoperationoffullbridgesquarewave, PWM inverters. Voltage and harmonic control at output of inverter. Single phase current source inverter, series inverter	*6*
MODULE 5	**AC Voltage Controllers** Types of single-phase voltage controllers, single-phase voltage controller with R and RL type of loads. Phase Control, sequence control	*5*
MODULE 6	**Applications** SMPS, Power line disturbances, EMI/EMC, power conditioners. Block diagram and configuration of UPS, salient features of UPS, selection of batteryand charger ratings,. Separately excited DC motor drive. P M Stepper motor Drive.	*6*

TextBooks/SuggestedReferences:

1) P.S.Bimbhra,PowerElectronics,KhannaBookPublishing,2022.
2) MSingh,KKhanchandani,"PowerElectronics"McGrawHillEducation,2ndEd.,2017
3) MuhammadH.Rashid,"Powerelectronics"PrenticeHallofIndia.
4) NedMohan,Robbins,"Powerelectronics", editionIII,JohnWileyandsons.
5) P.C.Sen.,"ModernPowerElectronics",edition II,S.Chand&Co.
6) V.R.Moorthi,"PowerElectronics", OxfordUniversityPress.

7) CyrilW.,Lander,"PowerElectronics",editionIII,McGrawHill.
8) G K Dubey,S R Doradla,:Thyristorised Power Controllers",New Age International Publishers. SCR manual from GE, USA.

BEC23201P	**ANALOG CIRCUITS LABORATORY**	**0L:0T:2P**	**1 Credits**

Course Outcome:
At the end of the course, the students will be able to
CO1:Design, test and evaluate the circuit of single stage and multi stage BJT amplifiers
CO2:Design and test power amplifier, feedback amplifier and oscillator circuits
CO3:Design and analyze the circuits using OP-AMP
CO4:Analyze the results, and prepare a formal laboratory report

List of Experiment

Experiment No.	Name of the Experiment
1	To Study biasing techniques of single stage BJT amplifiers (Fixed bias).
2	To Study biasing techniques of single stage BJT amplifiers (Voltage divider bias).
3	To Study biasing techniques of two stage direct coupled BJT amplifiers.
4	To design a Darlington emitter follower circuit with and without bootstrapping and determine gain and bandwidth
5	To study small signal characteristics of BJT amplifiers.
6	Set-up and study working of complementary symmetry Class B Push pull power amplifier and calculate the efficiency.
7	Design and set up Hartley Osc circuit using BJT and determine Frequency of oscillation.
8	To study the operational Amplifier circuits as inverting amplifier.
9	To study the operational Amplifier circuits as non-inverting amplifier.
10	To study the operational Amplifier circuits as summing amplifier.
11	Design of Active Low Pass and High Pass Filter using operational Amplifier.

GIRIJANANDA CHOWDHURY UNIVERSITY, ASSAM
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BEC23202P	MICROPROCESSOR LAB	**0L:0T:2P**	**1 Credits**

Course outcomes:

On the completion of this laboratory course, the students will be able to:

CO1: Apply the fundamentals of assembly level / high level language programming of 8085 Microprocessor to perform arithmetic, logical, data transfer applications and branch/loop instructions.

CO2: Interface a microprocessor with peripherals for various applications.

List of experiment

1.Programs involving: Data transfer instructions

I. Assume 6 bytes of data are stored in memory locations from 9000h till 9005h. Write instructions to transfer the entire block of data (6 bytes) to new memory locations at 9100h till 9105h

II. Assume 6 bytes of data are stored in memory locations from 9000h till 9005h. Write instructions to transfer the entire block of data (6 bytes) to new memory locations at 9002h till 9007h.

2. Programs involving: Arithmetic & logical operations:

I. Write a program to add the numbers 32h and 42h and save the result in Accumulator
II. Write a program to subtract 42h from 32h and save the result in Accumulator.
III. Write instructions to add the contents of memory location 9200H with contents of memory location 9101h and store the sum in the memory location 9102h.
IV. Add the 16 bit number stored in memory locations 9200h and 9201h with another 16 bit number stored in memory locations 9300h and 9301h. Store the sum in memory locations 9302h and 9303h.
Assume the numbers are stored in the below mentioned format:
9200h ---- LSbyte , 9201 ---- MSbyte of first 16 bit number.
9300h --- LSbyte, 9301h ---- MSbyte of second 16 bit number.
9302h --- LSbyte, 9303h ---- MSbyte of result
V. Subtract the 16 bit number stored in memory locations 9200h and 9201h from another 16 bit number stored in memory locations 9300h and 9301h. Store the result in memory locations 9302h and 9303h.
Assume the numbers are stored in the below mentioned format:
9200h ---- LSbyte , 9201h ---- MSbyte of first 16 bit number.
9300h --- LSbyte, 9301h ----MSbyte of second 16 bit number.
9302h --- LSbyte, 9303h ---- MSbyte of result.
VI. Write a program to multiply two 8 bit numbers stored in memory locations 9050h and 9051h and store the product in memory locations 9052h and 9053h. Store the LSbyte in 9052h and MSbyte in 9053H.
VII. Divide the contents of memory location 961CH by the contents of memory location 961DH and store the quotient and remainder in memory location 961Eh and 961Fh Respectively

4.Programs involving: Branch/ Loop instructions like

I. Six Bytes of data are stored in memory locations starting at 9100h. Add all the data bytes. Use register B to save any carries generated while adding the data bytes. Store the entire sum at two consecutive memory locations 9200h and 9201h. Store LSByte at 9200h and MSByte at 9201.
II. Certain number of bytes of data is stored in memory locations starting at 9100. Numbers of bytes are unknown. End of data string is indicated by 00h. Add all the data bytes. Use register B to save any carries generated while adding the data bytes. Store the entire sum at two consecutive memory locations 9200h and 9201h. Store LSByte at 9200h and MSByte at 9201h.
III. Write a program to find the largest and smallest nos.
IV. Write a program to arrange an array in Ascending and descending order

5. Interfacing Experiments: Experiments on interfacing 8085 with the following interfacing
modules

I. Matrix keyboard interfacing
II. Seven segment display interface
III. Logical controller interface
IV. Stepper motor interface
V. Analog to Digital Converter Interface (8 bit)
VI. Light dependent resistor (LDR), Relay and Buzzer Interface to make light operated switches

GIRIJANANDA CHOWDHURY UNIVERSITY, ASSAM
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BEC23203P	**ANALOG COMMUNICATION** LAB	**0L:0T:2P**	**1 Credits**

Sub: Lab

Course outcomes:
At the end of this course students will demonstrate the ability to
CO1: Illustrate the principles of amplitude and angle modulation techniques
CO2: Analyze the behaviour of a communication system in presence of noise.
CO3: Analyze the characteristics of AM receiver.
CO4: Analyze Pulse modulation techniques and different multiplexing schemes.

List of Experiment

Experiment No.	Name of the Experiment
1	To Study Amplitude Modulation (DSB-SC) and demodulation.
2	To study Amplitude modulation (DSB-FC) and hence determine modulation index.
3	To study demodulations of AM signal (DSB-FC).
4	To study Phase Locked Loop (PLL) circuit and hence determine free running frequency, locked frequency and capture range of a PLL Circuit.
5	To study Pulse Amplitude Modulation (PAM).
6	Study of Selectivity of a Radio Receiver via cable.
7	Study of image frequency.
8	Study of Frequency Modulation
9	Study of demodulation of FM signal.

GIRIJANANDA CHOWDHURY UNIVERSITY, ASSAM
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BEC23204P	**CED PROGRAMMING LAB**	**0L:0T:2P**	**1 Credits**

Course Outcomes:
At the end of this lab, students will demonstrate the ability to

CO1: Write, test, and debug simple Python programs.

CO2: Implement Python programs with conditionals and loops.

CO3: Develop Python programs step-wise by defining functions and calling them.

CO4: Use Python lists, tuples, dictionaries for representing compound data.

CO5: Read and write data from/to files in Python.

1.Write a program in python to print a message. (e.g., Hello World!)

2.Write a program to input a string and display it.

3.Write a program to input a number and display it.

4.Write a program to add a number and a string. Observe the output. Is it running fine?
Ifit is incorrect, correct it.

5.Write a program to input the value of a,b,c,a,g and k. Find the value of X. X=a4+b*c-a/4+(g%5-k//a)

6.Write a program to enter any two numbers now check the numbers using the following operators.

(==, !=, >, <,>=, <=,)

7.Write a program to enter any two numbers and use the following operators.

(+=, -=,*=,/=,%=, **=, //=)

8.Write a program to enter any two numbers and use the logical operation on them.

(and, or, not)

9.Write a program to enter two numbers and test, is and is not identity operators.

10.Write a program to find the bigger between two numbers.

11.Write a program to find the largest of three numbers.

12.Write a program to print the days of the week using nested if.

(eg. If 1, print Monday, 2, Tuesday.....etc.)

13.Write a program using while loop find sum of the following series. 1+3+5+7+.....+N

14.Create a list of 10 numbers, and display.

15.Create a heterogeneous list, and display it.

16.Create a list „L" of 10 numbers. Observe the following.

a.print L[0]

b.print L[1:5]

c.print L[:]

d.print L[1:5:2]

e.print L[-1]

f. print L[-5:]

g. print the length of the list

h.Update the list „L".

i. Delete any two values from the list.

j.Perform L+[234, 456,765]

k.Perform L*4

l.Check whether a number is present in the list „L" or not.

(hint: use in)

m.Print all the elements of „L" using a for loop.

n.Print the maximum and minimum value of „L".

o.Apply append() function to insert a number to the list „L".

p.Apply count() function to count objects of the list „L".

q.Apply extend() function to merge two lists.

r.Apply index() function to find index of elements.

s.Apply remove() function to remove an element from a list.

t.Apply reverse() to reverse a list.

u.Apply sort() to sort a list

17.Create a tuple T of 10 numbers. Observe the following.

a.Use len() to find the length of the tuple.

b.Apply T+(100, 200, 300) on T.

c.Apply T*4

d.Check whether a number is present in the tuple „T" or not. (hint: use in)

e.Print all of „T" using a for loop.

f.Print the maximum and minimum value of „T".

18.Design two complex objects c1 and c2, try to perform the following operations:

a.addition of c1 and c2

b.multiplication of c1 and c2

c.division of c1 and c2

19.import math module and execute the following functions:

a.abs(arg) ##(abs(arg) function does not need the import of math module)

b.ceil(arg)

c.exp(arg)

d.fabs(arg)

e.floor(arg)

f.log(arg)

g.log2(arg)

h.modf(arg)

i.pow(x, y)

j.sqrt(arg)

20.import random module and execute the following functions:

a.choice(arg) #arg can be list or tuple or string

b.randrange(start, stop, step)

c.random()

d.shuffle(list)

e.uniform(x, y) # output is a random number R, such that R is less than or equal to Rand
R is less than y.

f.randint(x, y) # generate a random number within the given range

21.import math module print pi and e.

22.Apply the following trigonometric functions:

a.sin(x) # x is in radian

b.cos(x)

c.tan(x)

d.asin(x)

e.acos(x)

f.atan(x)

g.atan2(y,x) # returns atan(y/x) in radians

h.hypot(x, y) # returns sqrt(x*x + y*y)

i.degrees(x) # converts x to degree

j.radians(x) #converts x from degree to radians

23.Write a program to convert binary, hexadecimal and octal number in python.

24.Write a program to create dictionaries and its operations.

25.Write a function to display 'Welcome to Python Programming!'

26.Write a function to add all the numbers in a given range.

27.Write a function to find the bigger number between two numbers.

28.Write a function to find the largest of three numbers.

29.Write a function to find the factorial of a number.

30.Write a function to find the area of a circle.

31.Write a function to show the use of default parameter value.

32.Write a function to show the use of global variables.

33.Write a function calculate the distance between two points (x1, y1) and (x2, y2)

34.For a quadratic equation in the form ax^2 + bx + c, thediscriminant D, is b^2-4ac. Write a function to compute the discriminant D, thatreturns the following output depending on the discriminant D.

a.if D > 0: The equation has two real roots

b.if D == 0: The equation has one real root.

c.if D < 0: The equation has two complex roots

35.Write a function to calculate the absolute value of a given number.

36.Write a function to calculate factorial using recursion.

37.Write a recursive function to generate nth fibonacci number.

38.Write a lambda function or anonymous function to calculate the cube of a number.

39.Write a function to calculate GCD of two numbers.

40.Write a function to find the sum of the digits of a number.

41.Write a function to reverse a number.

42.Write the function countB(word) which takes a word as the argument and returns the number of 'b' in that word.

43.Write a function to eliminate all occurrences of a letter.

44.Write a function to eliminate the first occurence of a letter.

45.Write a function to check if a given string is palindrome or not.

46.Write a function to count the occurence each vowel in a string.

47.Write a function to read a string and display 'Total number of uppercase and lowercase letters'.

48.Write a function to extract the numbers present in a string.

49.Write a function to extract the special characters(!, #, $, %, etc.) from a string.

50.Write a function to duplicate all the elements of a list.

51.String operations

a.s1 = '' # creating a empty string

b.s2 ='HelloWorld' or s2 = str('HelloWorld')

c.len(s2)

d.min(s2)

e.max(s2)

f.s2[0]

g.s2[5]

h.s2[-1]

i.s2[-2]

j.s2[-4]

52.Write programs to show the use of upper(), lower, isalpha(), isdigit(), split(), isalnum().

53.Write programs to read, write, append, etc. operations on external files.

54.Write programs to demonstrate class and object in python.

55.Write programs to show the operator overloading and function overloading, function overriding in python.

56.Write programs demonstrate the inheritance in python.

57.Write programs using re module and use findall(), search(), split(), sub(), etc. related to regular expressions.

58. Write a program to show the use of try, except.

59. Write a program to show the use of try, except and finally.

60. Write a program to raise an exception.

61. Write a program to define user defined exceptions.

62. Write a program to demonstrate a multi threaded execution.

63. Write a program to synchronize thread.

64. Write a program to implement a multithreaded priority queue.

65. Demonstrate multiprocessing using multiprocessing module.

66. Write a client-server program to establish connection using socket.

67. Write a client-server program to implement echo server using socket.

68. Write a program to establish connection with the database.

69. Write a program to retrieve data from a database table.

70. Write a program to store and retrieve the stored data from a database table.

71. Write a program to demonstrate the GUI components (Button, Frame, Label, Menu, etc.)

72. Write a program to demonstrate a simple CGI program.

73. Write a CGI program to pass information using the GET and POST method.

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