MKSSS's Cummins College of Engineering for Women, Pune
(An Autonomous Institute Affiliated to SavitribaiPhule Pune University)

Autonomous Program Structure of
Second Year B. Tech. Third Semester
(Instrumentation & Control Engineering)
Academic Year: 2021-2022 Onwards

Course Code	Course Title	Teaching Scheme Hours /Week			Examination Scheme				Marks	Credit
		Lecture	Tutorial	Practical	In Semester	End Semester	Oral	Practical		
20BSIN301	Transform Calculus and Statistics	3	1	0	50	50	0	0	100	4
20IN301	Sensors and Transducers	3	1	0	50	50	0	0	100	4
20IN302	Industrial Instrumentation	3	1	0	50	50	0	0	100	4
20IN303	Analog and Digital Electronics	3	1	0	50	50	0	0	100	4
20HS301	Universal Human Values-II	2	1	0	50	50	0	0	100	3
20IN301L	Sensors and Transducers Lab	0	0	2	25	0	0	25	50	1
20IN302L	Industrial Instrumentation Lab	0	0	2	25	0	25	0	50	1
20IN303L	Analog and Digital Electronics Lab	0	0	2	25	0	0	25	50	1
20IN304L	Programming Practice Lab	0	0	4	25	0	0	25	50	2
20AC301	Audit Course	0	0	1	0	0	0	0	0	No Credit
	Total	**14**	**5**	**11**	**350**	**250**	**25**	**75**	**700**	**24**
	Grand Total	**30**			**700**				**700**	**24**

APPROVED BY
Secretary Governing Body
MKSSS's Cummins College of Engineering
For Women, Pune-411052

CUMMINS COLLEGE OF ENGINEERING FOR WOMEN
KARVE NAGAR, PUNE-411 052

APPROVED BY
Chairman Governing Body
MKSSS's Cummins College of Engineering
For Women, Pune-411052

20BSIN301 Transform Calculus and Statistics

Teaching Scheme:
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme:
In Semester: 50 Marks
End Semester: 50 Marks
Credit: 4

Prerequisites:
1. Basics of integral and multiple integral.
2. Beta function, Gamma function.
3. Partial fractions.
4. First order linear differential equation.
5. Basic statistics and basic probability

Course Objectives:
Mathematics is a necessary path to scientific knowledge which opens a new perspective of mental activity. Our aim is to provide sound knowledge of engineering mathematics to make the students think mathematically and strengthen their thinking power to analyze and solve engineering problems in their respective areas.

Course Outcomes:
On completion of this course the students will be able to,
1. Obtain Laplace Transform of given functions, solve differential equations using Laplace Transform.
2. Obtain Fourier transform and Z transform for discrete sequences.
3. Obtain the solution of higher order Linear differential equations
4. Apply concepts of Statistics to interpret given data, calculate probabilities of random events.

Unit 1: Laplace Transforms **(07)**
Definition of Laplace Transform, Inverse Laplace transforms (LT), Properties and theorems, LT of standard functions, LT of some special functions viz. periodic, unit step, unit impulse, application of LT for solving Differential Equations, electrical circuits,

Unit 2: Fourier Transforms **(07)**
Periodic functions, Dirichlet's condition, Complex form of Fourier series, Introduction to continuous Fourier Transforms, basics of Sequences, Discrete Fourier Transforms (DFT) of standard sequences, Existence of DFT, Properties of DFT, Inverse DFT.

Unit 3: Z- Transform **(07)**
Definition, standard properties, Z- Transform of standard sequences, Inverse Z – Transform using standard results, Inversion integral method, solution of difference equation, Relation between Fourier , Z and Laplace Transforms.

Unit 4: Higher Order Linear Differential equation and application **(07)**
Higher order linear differential Equation with constant coefficients, complementary function, Particular integral, short cut methods, Method of variation of parameter. Cauchy's and Legendre's D.E., Modelling of electrical circuits.

Unit 5: Statistics **(06)**

Measures of central tendency, Standard deviation, Coefficient of Variation, Covariance, Correlation and Linear Regression, Moments, Skewness, Kurtosis

Unit 6: Probability and Probability Distribution **(08)**

Theorems on probability, Random Variables – Discrete & continuous, Mathematical expectations, Probability density functions, Standard discrete and continuous distributions like Binomial, Poisson, Normal, Introduction to Testing of hypothesis, Chi-square distribution test.

Text Books:

1. B. V. Ramana, 'Higher Engineering Mathematics', Tata McGraw Hill Publications, (2007).
2. B.S. Grewal, 'Higher Engineering Mathematics', Khanna publishers, Delhi (40th edition), (2008)
3. S.C. Gupta, V. K. Kapoor, 'Fundamental of Mathematical Statistics', S. Chand & Sons (10th revised edition), (2002).

Reference books:

1. C.R.Wylie, L.C. Barrette, 'Advanced Engineering Mathematics', McGraw Hill Publications, New Delhi (6th edition), (2003).
2. Erwin Kreyszig, 'Advanced Engineering Mathematics', Wiley Eastern Ltd. (8th Student Edition), (2004).
3. Peter V. O'neil, 'Advanced Engineering Mathematics', Thomson Brooks / Cole, Singapore (5th edition), (2007).

Tutorials:

Minimum 8 assignments based on the course contents

20IN301 Sensors and Transducers

Teaching Scheme:
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme:
In-Semester: 50 Marks
End-Semester: 50 Marks
Credit: 4

Prerequisites:
Electrical and Electronics Measurement
Methods of Measurement, Measurement System

Course Objectives:
1. To acquire the knowledge of basic principles of sensing various parameters
2. To study principles, working, mathematical relation characteristics, advantages and limitations of various sensors and transducers
3. To select appropriate transducer for the particular application

Course Outcomes:
By the end of the course, students should be able to
1. Students will be able to define and list performance characteristic of different sensors
2. Students can compare features of different sensors and transducers.
3. They can select sensors and transducers for particular applications.
4. Analyze the performance of sensors and transducers for various applications.

Unit 1: Temperature sensors **(07)**
Scope of sensors and transducers, concepts and terminology of measurement system, classification and selection criteria of transducers, temperature scales, units and relations, classification of temperature sensors, various Mechanical and Electrical temperature sensors, Non Contact temperature sensors - Radiation and optical.

Unit 2: Pressure and Level sensors **(08)**
Pressure scales, units and relations, types of manometers, various types of elastic pressure sensors, Calibrating Instruments, various types of Gauges, Direct and Indirect types of pressure measurement
Various level measurement techniques, Direct and Indirect types of level measurement, Electrical: Float, displacer (torque tube unit), ultrasonic, radioactive, radar , thermal. Capacitive, resistance. Optical level sensor, Inductive level sensor. Level switch.

Unit 3: Flow sensors **(08)**
Classification of Flow transducers, types of flow, Bernoulli‟s equation for incompressible flow, Head type flow meters,Variable area type, Other flow meters like Turbine, Target, Electromagnetic, Ultrasonic (Doppler, transit time), Vortex shedding, Positive displacement.

Unit 4: Force and Torque Measurement: **(07)**
Basic methods of force measurement, elastic force transducers, strain gauge, load cells, shear web, piezoelectric force transducers, vibrating wire force transducers, Strain gauge torque meter, Inductive torque meter, Magneto-strictive transducers, torsion bar dynamometer.

Unit 5: Allied sensors **(06)**

pH and conductivity, leak detector, flame detector, smoke detector, humidity, density, viscosity and Sound sensors, Displacement transducers-LVDT, RVDT, Encoders.

Unit 6: Smart and MEMS sensors: **(06)**

Principles of Smart Sensing, Classification and Terminology of Smart Sensors. MEMS (Piezoresistive, capacitive, conductive, optical), Introduction to sensor modeling.

Text Books:

1. A.K. Sawhney, "Electrical & Electronic Instruments & Measurement", Dhanpat Rai and Eleventh ed., 2000.
2. B. C. Nakra and K. K. Choudhari, "Instrumentation Measurements and Analysis", Tata McGraw Hill Education, Second ed., 2004.
3. D.V.S. Murty, "Instrumentation and Measurement Principles", PHI, New Delhi, Second ed 2003
4. R. K. Jain, "Mechanical and Industrial Measurement", Khanna Publications - 9th print
5. C.S. Rangan ,G..R.Sharma, V.S.V Mani , "Instrumentation Devices and Systems"
6. HKP Neubert. 'Instrument Transducers'

Reference Books:

1. E.O. Doebelin, "Measurement Systems", McGraw Hill, Fourth ed., 1990.
2. D. Patranabis, "Principle of Industrial Instrumentation", Tata McGraw Hill, Second ed.,1999
3. Sabrie Soloman, "Sensors Handbook", McGraw Hill Publication, First ed., 1998.
4. B.G. Liptak, "Process Measurement & Analysis", Chilton Book Company, Third ed., 1995.

Tutorials:

Minimum 8 assignments based on the course contents

20IN302 Industrial Instrumentation

Teaching Scheme
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credit: 4

Prerequisites:
Basics of Electrical measurements and Network Theory

Course Objectives:
1. To explain the concept of different characteristics of measurement systems.
2. To use different types of ADC and DAC used for various applications.
3. To measure different parameters using different modes of measurement instruments.
4. To use and design analog filters based on different applications.

Course Outcomes:
At the end of this course, students will be able to:
1. Define different characteristics of instruments.
2. Choose ADC and/or DAC for a given application.
3. Differentiate different modes of operation in a given measuring instrument.
4. Measuring different parameters by selecting appropriate testing and measuring instruments for given application.

Unit 1: Introduction (08)
Introduction to Instrumentation System, General Measurement System, Classification of Instruments, Static and Dynamic characteristics of instruments, Error: limiting error, Types of Errors, Loading effect, Calibration: Definition, calibration report & certification, traceability

Unit 2: ADC and DAC (08)
Sampling Theorem, Sample and Hold Circuit, ADC characteristics definition, ADC Specifications, Various types of analog to digital converters (ADC), Various types of digital to analog conversion (DAC) techniques, Pulse Width Modulation Technique, Interpretation of ADC and DAC ICs, their specifications and selection for a given application.

Unit 3: Digital Panel Meter and Virtual Instrumentation (07)
Digital Panel Meters, Scale adjustment, Digits and display, Significance of ½ and ¾ digit. Need of VI, Advantages of VI, Define VI, block diagram and architecture of a virtual instrument, Application of Virtual Instrumentation

Unit 4: Measuring Instruments and Test Equipment (07)
RMS definition, RMS measurement, RMS value of sine and pulse, True RMS meter, DMM, Standard AC and DC sources, Automation in DVM, Universal Counter and different modes, Digital Storage Oscilloscope, Measurement of voltage, frequency, phase difference, sampling rate, bandwidth, roll mode

Unit 5: Signal Sources and Signal Analyzers (06)
Sine wave generator, sine wave synthesis, audio and function generator, arbitrary waveform generator and its applications in instrumentation.

Introduction to total harmonic distortion, wave analyzer and its applications, FFT analyzer and their applications

Unit 6: Filters and application **(06)**

Introduction to filters, Characteristics, Definition, Realization of filters, Butterworth filters, applications of filters

Text Books:

1. A K Sawhney: A course on electrical and electronic measurements and instrumentation, Dhanpat Raj & Co, 2005
2. D Patranabis: Principle of Industrial Instrumentation, Tata McGraw-Hill, New Delhi 2004
3. John P.Bentley: Principles of measurement systems, 3rd edition, Addison Wesley Longman, 2000.
4. David A Bell: Electronic Instrumentation and measurement, Prentice Hall of India
5. M.M.S.Anand: Electronic instruments and instrumentation Technology, Prentice-Hall of India, 2004.

Reference Books:

1. Alan S.Morris: Principles of measurement and instrumentation, 2nd edition, Prentice-Hall of India,2004.
2. Electrostatic Discharge and Electronic Equipment, Warren Boxleitner IEEE press.
3. Measurement Fundamentals, National Instruments, www.ni.com
4. Elements of Electronic Instrumentation and Control, J.J.Carr, Prentice Hall, 3rd edition
5. Electronic Instrumentation and Measurement Techniques, W.Cooper, A.Helfric, PHI, 3rd edition
6. Handbook of Electronic Instrumentation, Coombs,

Tutorials:

Minimum 8 assignments based on the course contents

20IN303 Analog and Digital Electronics

Teaching Scheme: **Examination Scheme:**

Lectures: 3 Hrs/week
Tutorial: 1 Hr/week

In Semester: 50 Marks
End Semester: 50 Marks

Credit: 4

Prerequisites:
1. Concepts in basic electrical and electronics engineering
2. Concept of logic gates, number systems, Transistor theory and application

Course Objectives:
1. To illustrate the concepts of the basic characteristics, construction, open loop & close loop operations of Operational-Amplifier (Op-amp)
2. To enable students to analyze and design different linear and non-linear circuits using Op- amp and to introduce applications of various configurations of amplifiers.
3. To enable students to demonstrate different digital circuits.
4. To design different applications using digital circuits.

Course Outcomes:
At the end of this course, students will be able to:
1. Define different characteristics of operational amplifier (op-amp).
2. Select proper configuration of op-amp for different analog circuits.
3. Design counters, multiplexers, demultiplexers using the various building blocks.
4. Implement and test the performance of designed digital circuits.

Unit 1: Operational Amplifier Fundamentals **(05)**
Block diagram of Operational amplifier, Characteristics of Operational amplifier, comparative study of different amplifiers (LM741, LM324, OP07)

Unit 2: Linear Applications of Op Amps **(08)**
Introduction to feedback, Non-inverting, Inverting and differential amplifier, Instrumentation amplifier, Equation solving with Op-amp, I/V and V/I, Current booster converter, voltage regulator, SMPS, Signal conditioning circuits

Unit 3: Non-Linear Applications of Op Amp and timer LM555 **(07)**
Comparator, Zero Crossing Detector (ZCD), Schmitt trigger, window detector,: Wein bridge, LM555 timer, Signal conditioning circuits

Unit 4: combinational and clocked logic circuits **(08)**
Universal logic circuit: Mux, Demux. Decoders, Encoders, Interfacing TTL-CMOS and CMOS-TTL, Flip-flops: SR, JKMS, DFF and their truth table

Unit 5: Counters and timers **(07)**
Sequential and non-sequential counters: Ring, Johnson, BCD, Binary counters, programmable counters, shift registers

Unit 6: Applications of flip-flops, Counters and shift registers **(07)**

Digital Display, Digital clock, Alarm annunciator, Digital timer, call bell system and similar applications

Text Books:

1. Ramakant Gaikwad, "Operational Amplifiers" PHI, 3 rd ed., 1992.
2. William D. Stanley, "Operational Amplifiers with Linear Integrated Circuits", 4th edition, Pearson Education India, 2002.
3. Malvino and Leach, "Digital Principles & Applications", 4th Edition, Tata-McGraw-Hill
4. Gothman, "Digital Electronics", 2nd Edition, PHI

Reference Book:

1. Paul Horowitz, Winfield Hill , "The Art of Electronics", 2nd Ed., Cambridge University press,
2. Ronald J. Tocci, Neal S. Widmer and Gregory L. Moss, "Digital Systems, Principles and Applications", 10th Edition, Pearson Education International.

Tutorials:

Minimum 8 assignments based on the course contents

20HS301 Universal Human Values-2: Understanding Harmony

Teaching Scheme:
Lectures: 2 Hrs/week
Tutorial: 1 Hr/week

Examination Scheme:
In Semester: 50 Marks
End Semester: 50 Marks

Credit: 3

Prerequisites: -

Course Objectives:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Course Outcomes:

After completion of the course, students will be able to

1. Understand human values which are only the solution of most of the present-day problems and a sustained solution could emerge only through understanding of value-based living.
2. Compare desires of 'I' and 'Body' distinctly. If any desire appears related to both, students are able to see that the feeling is related to I while the physical facility is related to the body.
3. Develop Natural acceptance which is always for living in harmony which leads to fulfillment in relationship.
4. Understand the whole existence to see the interconnectedness in the Nature.
5. Make use of sustainable solutions to the problems in the society and the Nature.

Unit 1: Introduction to Value Education (06)

Understanding Value Education ,Self exploration as the Process for Value Education, Continuous Happiness and Prosperity which is the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Current Scenario for Happiness and Prosperity, Method to Fulfill the Basic Human Aspirations.

Unit 2: Harmony in the Human Being (06)

Understanding Human being as the Co-existence of the Self and the Body, distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Program to ensure self-regulation and Health.

Unit 3: Harmony in the Family and Society (06)

Harmony in the Family, Family being the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, Trust which is the Foundational Value in Relationship,

Respect as the Right Evaluation, Understanding Harmony in the Society, Vision for the Universal Human Order.

Unit 4: Harmony in the Nature or Existence (04)
Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels and the Holistic Perception of Harmony in Existence.

Unit 5: Implications of the Holistic understandings, a look at professional ethics (06)
Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models, Typical Case Studies with Strategies for Transition towards Value-based Life and Profession.

Text Books:

1. R. R. Gaur, R. Asthana, G. P. Bagaria, "The Textbook A Foundation Course in Human Values and Professional Ethics", Excel Books, New Delhi, (2nd Revised Edition), (2019).
2. R. R. Gaur, R. Asthana, G. P. Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", Excel Books, New Delhi, (2nd Revised Edition), (2019).

Reference Books:

1. A.Nagaraj,"Jeevan Vidya: EkParichaya", Jeevan Vidya Prakashan, Amarkantak, (1999).
2. A.N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, (2004).
3. Mohandas Karamchand Gandhi, "The Story of My Experiments with Truth", Prakash books
4. Publishers, Daryaganj, New Delhi, (1983).
5. E. F. Schumacher, "Small is Beautiful", Harper CollinsPublishers, Noida, Uttar Pradesh,
6. (2010).
7. Cecile Andrews, "Slow is Beautiful", New Society Publishers, Canada, (2006).
8. J. C. Kumarappa, "Economy of Permanence", Sarva Seva Sangh Prakashan, Wardha,
9. Sevagram, (2017).
10. Pandit Sunderlal ,"Bharat Mein Angreji Raj", Prabhat Prakashan, New Delhi (2018).
11. Dharampal,"Rediscovering India", Society for Integrated Development of Himalayas, (2003).
12. Mohandas Karamchand Gandhi, " Hind Swaraj or Indian Home Rule", Navajivan Publication House, Ahemadabad (2003).
13. Maulana Abdul Kalam Azad, "India Wins Freedom", Orient BlackSwan, (1989)
14. Romain Rolland, " Swami Vivekananda", Advaita Ashram Publication Ramkrishna Math, (2nd Edition), (2010).
15. Romain Rolland, "Gandhi", Srishti Publishers & Distributor, (2002).
16. Annie Leonard, "The story of stuff", Little, Brown Book Group, (2005).

Online Resources:
NPTEL course on Humanities and social sciences
https://nptel.ac.in/courses/109/104/109104068/

Tutorials:
Minimum 8 assignments based on the course contents

20IN301L Sensors and Transducers Lab

Lab Scheme:
Practical: 2 Hrs/Week

Examination Scheme:
In Semester: 25 Marks
Practical: 25 Marks
Credit: 1

Course Outcomes: by the end of the course, students should be able to
1. Students will be able to do characterization of sensors
2. Students can compare characteristics of different sensors and transducers.
3. They can select sensors and transducers for particular applications.
4. Analyze the sensors and transducers for various applications.

List of Practical Assignments:
1. Study the working of Dead weight pressure gauge tester and calibration of pressure gauge using it
2. Study the working of a vacuum gauge tester and calibration of vacuum gauge using it
3. Plot the characteristics of RTD and Thermistor calculate its time constant.
4. Plot the characteristics of Thermocouple and study cold junction compensation.
5. Design and Test Air purge probe/capacitive for Level Measurement.
6. Flow measurement using Rotameter, orifice and Electromagnetic flow meter.
7. Measurement of viscosity of various liquids using Red wood Viscometer.
8. Water level measurement using Piezoresistive MEMS sensor.
9. Weight measurement using cantilever beam/load cell.
10. Conductivity measurement using virtual lab platform.

Or similar type of practical assignments based on the course contents

20IN302L Industrial Instrumentation Lab

Lab Scheme:
Practical: 2 Hrs/Week

Examination Scheme:
In Semester: 25 Marks
Oral: 25 Marks
Credit: 1

Course Outcomes: at the end of this course, students will be able to

1. Measure/Test various parameters using appropriate measuring/testing instruments
2. Use appropriate ADC and/or DAC for given application.
3. Calibrate the instruments for minimizing errors in the measurement.
4. Develop Virtual instrumentation systems for practical applications

List of Practical Assignments:

1. Study and implementation of ADC IC 0809
2. Study and implementation of DAC IC 0808
3. Measurement of True RMS value using True RMS meter
4. Study and verify different modes of Universal Counter
5. To measure time constant of relay using Digital Storage Oscilloscope
6. To build a function generator using IC
7. Hand-on on Lab View software
8. Design and realization of filter
9. Study and application of distortion meter

Or similar type of practical assignments based on the course contents

20IN303L Analog and Digital Electronics Lab

Teaching Scheme
Practical: 2 Hrs/week

Examination Scheme
In Semester: 25 Marks
Practical: 25 Marks
Credit: 1

Course Outcomes: the student will be able to
1. Verify and compare the performance characteristics of different configurations of OPAMP.
2. Design and implement linear and non-linear circuits using OPAMP.
3. Select appropriate components for given application
4. Design and test signal conditioning circuits for industrial application.

List of Practical Assignments:

(Any 3 from)
1. Measurement of CMRR, Slew rate and output offset voltage.
2. Verification of gain for inverting and non- inverting amplifier.
3. Designing and implementation of Instrumentation amplifier using IC LM324.
4. Designing and implementation of Wien bridge oscillator.
5. Designing and implementation of Comparator, Schmitt trigger and Zero Crossing Detector.

(Any 1 from)
1. Designing and implementation of buzzer using LM555.
2. Designing and implementation of flasher light using LM555
3. Designing and implementation of porch-light control unit using LM555

(Any 2 from)
1. Study and implementation of logic circuit using Mux/Demux
2. Study and implementation of Johnson and Ring Counter using D-FF IC 7474 or Shift Register IC 7495
3. Study of Presettable Up/Down Counter using IC 74193.
4. Design of Non Sequential Counter using flip –flop ICs.

(Any 2 from)
1. Implementation of running light using shift register
2. Alarming annunciator circuit using Mux. for 3 conditions stated in process
3. Implementation of digital timer using IC 74193
4. Simulation of Digital Clock using digital ICs

Or similar type of practical assignments based on the course contents

20IN304 Programming Practice Lab

Teaching Scheme:
Practical: 4 Hrs/week

Examination Scheme:
In Semester: 25 Marks
Practical: 25 Marks
Credit: 2

Course Outcomes: the student will be able to
1. List and identify the steps for the given problem statement.
2. Apply different programming tools for logic development.
3. Implement the developed logic in the given programming language.
4. Develop and design appropriate programs for practical applications.

List of Practical Assignments-:

Group A: [Any 3 minimum]

1. Write a Python program to enter marks of five subjects and calculate total and percentage.
2. A. Write a Python program to swap two numbers/digits in a number.
   B. Write a python program to find the greatest number among three given numbers by using ternary operator.
3. Write a Python program to perform the sum of digits of a 3 digit number.
4. Write a Python program to calculate DA and HRA on the following conditions
   Enter basic salary as user input user.

Salary	*DA as per salary*	*HRA as per salary*
<=2000	*10%*	*20%*
>2000	*20%*	*30%*
&&		
<=5000		
>5000	*30%*	*40%*
&&		
<=10000		
>10000	*50%*	*50%*

5. Write a Python program to find out the average and median among three given numbers.

Group B: [Any 5 minimum]

6. Write a Python program to print all alphabets (Capital and small) using while loop
7. Write a Python program to find the sum of all even numbers between 1 to n.
8. Write a Python program to find the sum of the first and last digit of the entered number.

9. Write a Python program to check whether the entered number or string is palindrome or not.
10. Write a Python program to print the following pattern
2 3 5 7 11 13… till 100
11. Write a Python program to find the power of a number using a for loop.
12. Write a Python program to find all factors of a number.
13. Write a Python program to find the sum of all prime numbers between 1 to n.

Group C: [Any 4 minimum]

14. Write a Python program to get a string made of the first 2 and the last char from a given string. For eg: Input : beautiful Expected Output : bel
15. Write a Python program to get a string from a given string where all occurrences of its first char have been changed to '#', except the first char itself. For eg: Input: abracadabra Expected Output : abr#c#d#br#
16. Write a Python program to add 'ing' at the end of a given string (length should be at least 3). If the given string already ends with 'ing' then add 'ly' instead. If the string length of the given string is less than 3, leave it unchanged. For eg: Input: test Expected Output: testing If the Input : testing Expected Output: testingly
17. A.Write a Python program to get the largest number from a list
B. Write a Python program to multiply all the items in a list.
18. Write a program to remove all the duplicate elements from the list.
19. Write a Python program to count the number of strings where the string length is 4 or more and the first and last character are the same from a given list of strings.

Group D: [Any 4 minimum]

20. Write a Python program to find common items from two lists.
21. Write a Python script to add a key to a dictionary.
22. Write a Python program to concatenate following dictionaries to create a new one. d1={1:110, 2:210}
d2={3:301, 4:401}
d3={5:5010, 6:6010}
23. A.Write a Python program to check if a given key already exists in a dictionary.
B. Write a Python script to print a dictionary where the keys are numbers between 1 and 10 (both included) and the values are squares of keys.
24. A.Write a Python program to sum all the items in a dictionary.
B. Write a Python program to remove a key from the given dictionary.
D = {'a':9,'b':8,'c':7,'d':6}
25. A.Write a Python program to sort a dictionary by key.
B. Write a Python program to remove duplicate values from the Dictionary.
26. Write a program to determine the occurrence of numbers in a list of numbers.