Cummins College of Engineering for Women

(An autonomous institute affiliated to Savitribai Phule pune university)

Karve Nagar, Pune - 411 052.

Vision

To be globally renowned engineering institute for imparting holistic education and developing professional women leaders in engineering and technology

Syllabus Structure and Syllabus

of

F. Y. BTech

2023 Pattern [R1]

List of Abbreviations

Abbreviation	Title
PCC	Programme Core Course
BSC	Basic Science Course
ESC	Engineering Science Course
PE	Programme Elective Course
OE	Open Elective
VSEC	Vocational and Skill Enhancement Course
CC	Co-curricular Courses / Liberal Learning Course
IKS	Indian Knowledge System
VEC	Value Education Course
RM	Research Methodology
INTR	Internship
PROJ	Project
CEP	Community Engagement Project
RM	Research Methodology
Mm	Multidisciplinary Minor
AEC	Ability Enhancement course

First Year
Curriculum for UG Degree Course in BTech. Computer Engineering and Information Technology Programs
(Academic Year: 2025-26 Onwards)
Semester-II

Course Code	Course Title	Teaching Scheme Hours / Week			Cr	Examination Scheme			Total Marks
		L	T	P		ISE	ESE	Pr/Or	
BSC101	Physics	3	0	0	3	50	50	0	100
BSC201	Multivariate Calculus	3	1	0	4	50	50	0	100
*PCCxx201	Programming Core Course	2	0	0	2	25	25	0	50
ESC101	Engineering Graphics	2	1	0	3	50	50	0	100
IKS201	Indian Knowledge System	2	0	0	2	50	0	0	50
CC101	Social & Emotional Learning	1	1	0	2	50	0	0	50
AEC101	Professional Communication	1	0	2	2	50	0	0	50
BSC101L	Physics Lab	0	0	2	1	25	0	0	25
ESC101L	Engineering Graphics Lab	0	0	2	1	25	0	0	25
VSEC201L	Programming Skills in Python/ Java Language	0	0	4	2	25	0	25	50
	Total =	**14**	**03**	**10**	**22**	**400**	**175**	**25**	**600**

L=Lecture, T=Tutorial, P= Practical, Cr= Credits,
ISE =In Semester Evaluation,
ESE =End Semester Examination,
Pr/Or = Practical/Oral.

*PCCCE201: Object Oriented Paradigms in Java

*PCCIT201: Networking Essentials

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

APPROVED BY
Chairman Academic Council
MKSSS's Cummins College of Engineering
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BSC101 Physics

Teaching Scheme:
Lecture 3 Hrs/week
Credits: 3

Examination Scheme:
In-semester: 50 Marks
End-semester: 50 Marks

Course Objectives:
1. To offer broad areas of Physics which are required as an essential background for engineering students.
2. To develop students' ability to understand fundamental principles of electromagnetism, optics, statistical physics, and quantum physics, and apply these concepts effectively to solve problems.
3. To develop critical thinking in analyzing the properties of materials at bulk and nanoscales.

Course Outcomes:
After completion of this course a student should be able to
CO1: Apply the generalized Coulomb law and the law of Electromagnetic Radiation to determine the electric fields due to the stationary and the accelerated charges.
CO2: Apply the laws of Physical Optics to determine intensity distributions of interference – diffraction patterns, and to identify polarization-types.
CO3: Apply the principles of Statistical Physics to determine the thermal distribution of matter in different energy states and the thermal response of engineering materials.
CO 4: Justify the selection of — quantum probability rules and single qubit logic gates.
CO 5: Differentiate between the physical properties of 'nano' materials and of their 'bulk'counterparts.

Unit 1: Electromagnetic Radiation and Interference:

Expression for the electric field beyond Coulomb's law; Two dipole radiators and Physics of interference; Mathematical treatment (propagating waves, rotating vectors, complex functions)

Unit 2: Diffraction and Polarization:

The resultant amplitude due to equal oscillators; Diffraction Grating; The electric vector of light; Types of Polarized Light; Birefringence; Polarizers

Unit 3: Statistical Mechanics and Thermodynamics:

Principles of Statistical Mechanics (Distribution of particles in thermal equilibrium); Laws of Thermodynamics (Carnot Cycle, Entropy, Clausius-Clapeyron Equation); Information Entropy

Unit 4: Quantum Physics:

Laws of combining probability amplitudes; The Hamiltonian matrix & Schrödinger equation; Two-state systems: Pauli spin matrices & Photon polarization states; Single Qubit Logic Gates

Unit 5: Properties of Solids:

Band Theory; Electrical (conductivity, resistivity), Magnetic (dia-para-ferro), Optical (absorbance, reflectance, transmittance), Mechanical (hardness, elasticity) properties (of 'bulk' & 'nano' solids)

Text Book:

R. P. Feynman, R. B. Leighton and M. Sands, 'The Feynman Lectures on Physics', *Pearson Education* (2006)

Reference Books:

1. J. Walker, D. Halliday, R, Resnick, 'Principles of Physics', Wiley *Student Edition* (10th Edition)
2. H. Young and Roger Freedman, 'University Physics', Pearson Addison Wesley(12th Edition)

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BSC201 Multivariate Calculus

Teaching Scheme:
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week
Credits: 4

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

Course Objectives:

1. To familiarize the students with techniques of differentiation and integration of multivariable functions.

2. To equip the students to deal with advanced levels of Mathematics, and applications that would be essential for their discipline**.**

Course Outcomes:

After completion of this course, students will be able to

CO1: Calculate partial derivatives and solve problems using partial derivatives.

CO2: Analyze extrema of function of several variables and apply least square method for data fitting.

CO3: Solve double integral, triple integral over the region.

CO4: Determine physical parameters using double and triple integral.

Unit – I: Partial differentiation

Function of several variables, partial derivatives, Geometrical interpretation of partial derivatives, chain rule, higher order partial derivatives, Euler's theorem.

Unit – II: Applications of partial differentiation.

Maxima, minima and saddle points, second derivative test, constrained extrema and Lagrange's multipliers, applications in optimization of functions of several variables. Applications of first order partial derivatives in data fitting using the method of the least squares for linear and quadratic model.

Unit – III: Double integration

Tracing of curves in Cartesian and Polar coordinate system, double integrals over a rectangle, double integrals over regions, change of order of integration, Introduction of Jacobian determinant for two variables, double integral in polar coordinates, The Gaussian integral.

Unit – IV: Triple integration

Triple integral over a box, triple integrals by iterated integration, change of variables, Cylindrical and Spherical coordinates, The Jacobian determinant for three variables, evaluation of triple integral.

Unit – V: Applications of Double and Triple integration

Applications of double integral and triple integral: Area of plane Lamina, mass of plane lamina, surface area, volume, mass of solid.

Textbooks:

1. B. V. Ramana, **'Higher Engineering Mathematics',** *Tata McGraw Hill Publications,* (2007).
2. B.S. Grewal, **'Higher engineering Mathematics'***, Khanna publishers, (*40th edition), (2008).
3. Maurice Weir, Joel Hass, '**Thomas' Calculus'**, *Pearson India*, (13th edition), (2016).

Reference Books:

1. J.E. Marsden, A. J. Tromba and A. Weinstein, '**Basic Multivariable Calculus'**, *Springer,* (3rd edition)*,* (1993).
2. G. B. Thomas and R. L. Finney, **Calculus and Analytic geometry'**, *Pearson, Reprint* (9th Edition), (2002).
3. Sudhir Ghorpade, Balmohan Limaye, **A Course in Multivariable Calculus and Analysis'***,* (Undergraduate Text in Mathematics), *Springer* (2009).
4. Dennis G. Zill, Warren S. Wright**, Multivariable Calculus**, **Early transcendental'**, *Jones & Bartlett Publisher* (4th edition), (2009).

PCCCE201 Object Oriented Paradigm in Java

Teaching Scheme:
Lecture: 2 Hr/week
Credits: 2

Examination Scheme:
In-Sem: 25 Marks
End-Sem: 25 Marks

Course Objectives:

To facilitate the learners:

1. To Apply object-oriented concepts for given problems.
2. Construct readable and reusable code using inheritance, abstract class, interface and polymorphism.
3. Understand the significance of Exception handling in Java.
4. To design and implement an application using Java Programming.

Course Outcome:

By taking this course, the learner will be able to:

CO1: Make use of object oriented programming concepts using Java such as Class, Object constructor and control structures for program development.
CO2: Apply polymorphism and Inheritance for readability and reusability of code.
CO3: Apply concepts of abstract class, interface and packages for program development.
CO4: Demonstrate Exception handling concepts using in-built classes and user defined exceptions.

Unit-I : Introduction to Object Oriented Paradigm in Java

Need of object-oriented paradigm, basic concepts of object oriented programming (OOP), benefits of OOP. General characteristics for OOP, History of Java, Features of Java, Java and Internet, Java virtual machine, First java Program, Command line arguments, Java Programming elements: Data types, Control Structures, Encapsulation, Abstraction and Polymorphism, Class, object, constructor Illustration through real life examples and use cases.

Unit-II: Polymorphism and Inheritance

Function overloading, argument passing, constructor overloading, this, static, final keywords.
Types of inheritance, base class and derived class, access specifiers, method overriding. runtime polymorphism.Illustration through real life examples and use cases.

Unit-III: Abstract Class and Interfaces

Abstract class, interfaces, dynamic method dispatch, package, Java Collection Framework overview - ArrayList, Stack Illustration through real life examples and use cases.

Unit-VI: Exception Handling in Java

Errors and Exceptions, Types of exceptions, try, catch, throw, throws and finally keywords, Build-in exceptions, creating and using custom exceptions.
Illustration through real life examples and use cases.
Advance Java Concepts - Java Frameworks, Java for Application development, Java Full Stack Technologies, JAVA APIs.

Text Books:

1. Herbert Schilt, "JAVA Complete Reference", Tata McGraw Hill, (9thEdition), (2014)
2. Eckel B., "Thinking in Java", Pearson Education, (3rd Edition)

Reference Books:

1. Kathy Sierra & Bert Bates, "Head First Java", Oreilly publication, (2nd Edition) (2009)
2. Barry Burd "Beginning Programming with Java for Dummies", Oreilly publication, (5th Edition) (2017)
3.Paul Deital and Harvey Deital, "Java How to program", Prentice Hall Publication,(9th Edition) (2011)

PCCIT201 Networking Essentials

Teaching Scheme:
Lectures: 2 Hrs/Week
Credits: 2

Examination Scheme:
In-Semester: 25 Marks
End-Semester: 25 Marks

Course Objectives:

Familiarize students with the
1. Networking topologies.
2. Functionality of OSI data link layer and the key protocols associated with it.
3. Different media access control schemes.
4. Error detection mechanisms.

Course Outcomes:

After completion of this course, students will be able to
CO1: Select appropriate network topologies for various network scenarios.
CO2: Analyze various functions of OSI data link layer in data transmission.
CO3: Apply appropriate media access control methods.
CO4: Apply suitable error detection and correction mechanisms.

Unit – I: Introduction to Networking

The Architecture of the Internet, Principles of Layering and Encapsulation, Types of Networks: LAN, WAN, and MAN, Overview of Networking Devices, Introduction to Network Topologies, Point-to-Point and Pointto-Multipoint Topologies, LAN and WAN Design Demonstrations, Group Discussion: Analysing Network Designs.

Unit – II: Network Models and Protocols

Communication Platforms and Networking Protocols, Introduction to the OSI Model, Understanding the TCP/IP Model, Protocol Data Units (PDUs) and Encapsulation, Comparing the OSI and TCP/IP Models, Network Addressing Schemes, Case Study: Protocol Analysis and Comparison, Demonstrations: OSI and TCP/IP Models.

Unit – III: Data Link and Ethernet

Introduction to Ethernet, Ethernet Basics: Collision and Broadcast Domains, CSMA/CD and Half / FullDuplex Ethernet, Data Link Layer Functions and Design Issues, Ethernet addressing and Frame Structure, Channel Bonding and Aggregation, Error Detection and Correction in Data Link Layer, Demonstrations: Ethernet Setup and Frame Analysis

Unit – IV: Linear Block Codes and Physical Layer

Introduction to Linear Block Codes, Basics of Error-Correcting Codes, Linear Block Code Properties and Encoding, Decoding Linear Block Codes: Syndrome Decoding, Error Detection and Correction in Linear Block Codes, Transmission Media: Guided and Unguided Demonstrations: Linear Block Code Encoding and Decoding, Carrier Sense Multiple Access Protocol.

Text books:

1. Behrouz A. Forouzan, "Data Communications and Networking," McGraw Hill Education (5E), ISBN: 978-0072967753
2. Jeffrey S. Beasley and Piyasat Nilkaew, "Networking Essentials," Pearson, ISBN-13: 978-0134872023
3. Cisco Press, "Network Fundamentals"

Reference Books:

1. Olivier Bonaventure, "Computer Networking: Principles, Protocols and Practice"
2. Harjinder Singh, "Computer Networking: Principles and Protocols"
3. William Stallings, "High-Speed Networks and Internets: Performance and Quality of Service"
4. Andrew S. Tanenbaum, "Computer Networks," Pearson (6th edition, 2021

ESC101 Engineering Graphics

Teaching Scheme:
Lecture: 2 Hrs/week
Tutorial: 1 Hr/week
Credits: 3

Examination Scheme:
In semester: 50 Marks
End semester: 50 Marks

Course Objectives:
1. To develop the visualization and interpretation skills for the physical objects.
2. To provide the basic knowledge and develop the skills for creating 2 D drawings.
3. To provide the basic knowledge and develop the skills for creating Isometric views.
4. To familiarize about the development of solids.
5. To familiarize the construction and applications of Engineering Curves.

Course Outcomes:
After completing the course students will be able to draw
CO1: Orthographic and sectional orthographic projections of an object
CO2: Isometric views of the given object
CO3: Development of surfaces of the given object
CO4: Engineering curves by applying the given method

Unit 1

Introduction: Layout and sizes of drawing sheets, drawing instruments, types of lines used in drawing practice, dimensioning systems, representation of tolerances, standard codes by B.I.S (SP- 46). (Not for Examination)

Unit 2

Orthographic Projection: Theory of projections, methods of obtaining orthographic views, sectional orthographic projections, Missing views.

Unit 3

Isometric Views: Isometric axes, Isometric scale, isometric projections and views, construction of isometric view from given orthographic views

Unit 4

Development of Solids: Parallel line development, radial line development, methods to transfer points for development of prisms, pyramids, cylinder and cone.

Unit 5

Engineering Curves: Construction of ellipse, parabola, hyperbola, involute, cycloid, Archimedean spiral, helix on cone and cylinder.

Text Books:

1. N. D. Bhatt and V. M. Panchal, 'Engineering drawing, plane and solid geometry, Charotor Publication House.
2. R. K. Dhawan, 'A text book of Engineering Drawing', Pearson Education Inc.
3. P.S. Gill, 'Engineering Graphics', Kataria and sons Publications.
4. M. L. Dabhade, 'Engineering Graphics', Vision Publications.

Reference Books:

1. Warren J. Luzzader, 'Fundamentals of Engineering Drawing', Prentice Hall of India, New Delhi.
2. Fredderock E. Giesecke, Alva Mitchell, 'Principles of Engineering Graphics', Maxwell
3. Dhananjay A. Jolhe, 'Engineering Drawing', Tata McGraw Hill Publishing Co. Ltd.

CC101 Social and Emotional Learning

Teaching Scheme
Lecture: 1 hrs/week
Tutorial: 1-hour
Credits: 2

Examination Scheme:
In semester: 50 marks

Course Objectives:
1. Introduce social and emotional intelligence with significance in personal and professional development.
2. Equip students with skills to manage emotions, stress, and interpersonal relationships.
3. Foster empathy and teamwork in personal and professional contexts.

Course Outcome:
After completion of this course a student should be able to
1. Identify and reflect on their emotions, values, and behaviour patterns
2. Develop self-awareness, emotional regulation, stress management, and motivation.
3. Demonstrate empathy in diverse teams and social settings.

Unit 1: Introduction to Social and Emotional Learning

EQ Vs IQ, EQ importance and models (CASEL, Goleman), self-awareness, self-management, social awareness, relationship skills, and responsible decision-making, Types of emotions, Effect of emotions: physiological, thinking, actions and outcomes. Emotional maturity, Personality types, Role of SEL in academic success, and well-being

Unit 2: Self-Management and Personal Development

Managing emotions, impulses, and stress, tools: mindfulness, cognitive restructuring, SMART Goal setting, personal motivation (intrinsic vs. extrinsic), Time and stress management tools and techniques, building resilience and adaptability, Adversity quotient and grit, Techniques for building self-efficacy

Unit 3: Social Awareness and Relationship Building

Social quotient, understanding others' emotions, Empathy and Perspectives, Cognitive vs. affective empathy, Barriers to empathy, Active listening and reflective responding, building trust and rapport, understanding cultural differences and social identity, Digital identity, handling bias, Inclusive group dynamics

Textbooks:

1. Black, Donna Lord (2022). Essentials of Social and Emotional Learning (SEL). NJ : Wiley.
2. Goleman, Amiel (2005). Emotional intelligence. USA: Bantam.

Reference Books:

1. Daniel Goleman (1996) Emotional Intelligence. Why it can matter more than IQ. Bantam Doubleday Dell Publishing Group.
2. Daniel Goleman (2000) Working with Emotional Intelligence. Bantam Doubleday Dell Publishing Group
3. Liz Wilson, Stephen Neale & Lisa Spencer-Arnell (2012). Emotional Intelligence Coaching. Kogan Page India Private Limited

Suggested Assignments:

Minimum 8 assignments to be conducted

1. Take an EQ test and submit a 300-word reflection on key insights and growth areas.
2. Track and reflect on your emotions for 5 consecutive days. Identify patterns and triggers.
3. Identify 3 personal emotional triggers (Red = intense, Yellow = mild, Green = manageable) and discuss coping ideas.
4. Define a personal or academic goal using SMART criteria. Submit a progress report over 3 weeks.
5. State what is your view about success and happiness with examples.
6. Try at least 2 stress management techniques over a week. And write reflection.
7. Track your daily time usage for 3 days. And submit a revised weekly plan to improve time effectiveness.
8. Interview a peer about a challenge they're facing. Create an empathy map capturing thoughts, feelings, and needs.
9. Reflect on a time you worked with someone from a different background.
10. Role plays on a given situation for empathy learning.
11. Role plays on a given situation for conflict management.
12. Develop a personal plan that incorporates SEL goals for the next 5 years.
13. Choose any existing product or service and identify how you can make it more inclusive.
14. In small groups, invent a product or app with a social goal (e.g., sustainability, health). Present its ethical implications and suggest how it can be more inclusive.
15. Create a poster/short video based on topics/ your reflections/ event analysis

AEC 101 Professional Communication

Teaching Scheme
Lecture: 1 Hr/week
Practical: 2Hrs/week
Credits: 2

Examination Scheme:
In semester: 50 marks

Course Objectives:

1. Introduce fundamental concepts of professional communication
2. Enable students to communicate effectively
3. Prepare students to communicate effectively within teams
4. Develop skills in online communication etiquette and professionalism

Course Outcome:

After completion of this course a student should be able to

1. Explain the fundamentals of effective communication
2. Develop proficient written communication skills
3. Display their verbal communication skills through presentations
4. Utilize digital tools and platforms effectively for communication

Module 1: Foundations of Professional Communication

Importance and relevance of effective communication, 7 Cs of Professional Communication (Clarity, Conciseness, correctness, Coherent, concrete, courteous and Complete) Listening, non-verbal communication, Verbal communication, Written communication, Barriers to communication, Types of barriers (Linguistic, Psychological, Technological), channels.

Module 2: Technical Writing and Documentation

Principles of technical writing: audience, purpose, and context. Technical documentation formats: manuals, instructions, specifications. Visual aids, data presentation, proof reading, grammar and readability check, available tools, Email, reports, resumes, Project proposals, progress reports, working in teams, plagiarism and ethics.

Module 3: Professional Verbal Communication

Elements of effective verbal communication: clarity, tone, pace, volume. formal and informal communication, Body language, facial expressions, gestures, postures, eye contact, voice tone, Active listening, Presentations, public speaking, Storytelling, interpersonal communication.

Module 4: Digital Communication

Digital communication, digital footprints, email/ phone call/virtual meeting etiquette, Professional use of social media, blogs and networking platforms. Virtual meetings, social media Profiles, LinkedIn, security

issues, available tools.

Textbooks:

1. M. Ashraf Rizvi, "Effective Technical Communication", Tata McGraw-Hill Publishing Company Limited, New Delhi (2008)
2. Jeff Butterfield, "Soft Skills for Everyone" Cengage Learning India Private Limited, New Delhi (2019)

Reference Books:

1. William Strunk and E. B. White, "Elements of style", CreateSpace Independent Publishing Platform, (2018).
2. William K Zinsser, "On Writing well", HarperCollins, (2012).
3. Satish Ranade, "Presentations: An Art & A Science" , Vishwakarma Publications (2019)

Website URL:

TED talks - https://www.ted.com/talks

Suggested Assignments:

Minimum 8 assignments to be conducted during the practical sessions.

Proposed distribution: 1 assignment on listening skill, 3 assignments written communication, 3 assignments verbal communication, 1 group presentation.

1. Listen to audio podcasts/ watch a ted talk and make notes/summary of it.
2. Write an email to your professor/dream company requesting an internship, including proper subject, greeting, body, and closing.
3. Create a one-page resume and a tailored cover letter for a summer internship in your engineering domain.
4. Write a 300–400-word technical description of a common engineering object (e.g., a bicycle, USB drive, or power bank).
5. Create a LinkedIn profile and write a compelling "About" summary (100–150 words) highlighting your background and aspirations.
6. Choose a recent article from a tech magazine/blog and write a 300-word summary along with your reflection on its significance.
7. Draft Enquiry letter/ Complaint letter.
8. Present the summary of a ted talk/ podcast (3 minutes)
9. Narrate a story on any topic of your interest/hobbies/experience (3 minutes) such as movie review, yoga, sport, tour.
10. Record a one-minute introduction video/ Give one minute introduction
11. Conduct an interview with any person (define objective, prepare questionnaire and flow). Peer interviews encouraged within the batch (3 minutes).
12. In groups of 3-4, research an emerging technology (e.g., AI in transportation, green energy) and present it using slides in 7–10 minutes.
13. In groups of 3-4, prepare a possible technical project proposal and present it using slides in 7–10 minutes.
14. Review and provide feedback on a peer's presentation assignment based on a rubric.
15. Review and provide written feedback on a peer's resume, email, or technical writing assignment based on a rubric.

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BSC101L Physics Lab

Teaching Scheme:
Practical: 2Hrs./Week
Credits: 1

Examination Scheme:
In semester: 25Marks

Course Objectives:

The objective of the Physics Lab course is two-fold:
1. To inculcate experimental skills, and
2. To demonstrate the interplay between theoretical & experimental physics.

Course outcomes:

After completion of this course a student should be able to
CO 1: Record the observations as per the least counts of measuring instruments and perform necessary calculations.
CO 2: Compare the experimental findings with the corresponding theoretical physics models.
CO 3: Determine errors in experimental findings and Analyze their sources and causes.
CO 4: Reach the conclusions pertaining to the observed behavior of physical systems.

List of Experiments:

Physical Optics Experiments:

I. Polarization of light, II. Diffraction Grating: Emission Spectra, III. Michelson Interferometer, and IV. Newton's Rings.

Electromagnetism & Heat Experiments:

I. Dia-Para-Ferromagnetism: Magnetic Permeability, II. Faraday's Law, and III. Hysteresis (B-H) Curve of Iron core, IV: Specific Heat of solid materials.

Modern Physics Experiments:

I. Planck's Constant, II. I - V Characteristic of LED, III. Hall Effect, and IV. Zeeman Effect.

ESC101L Engineering Graphics Lab

Teaching Scheme:
Practical: 2 Hrs./week
Credits: 1

Examination Scheme:
In Semester: 25 marks

Course Objectives:
To familiarize student about
1. Advantages of using software for Engineering drawing
2. 2.2-D drafting using a software
3. 3-D modeling using a software
4. 3-D printing technology

Course Outcomes:
After completing the course using a software package students will be able to
CO1: Draw orthographic projections of a given component.
CO2: Draw Isometric projections of a given component.
CO3: Draw development of solids
CO4: Draw free hand sketches of the machine elements.

Part I

Introduction to 2-D Drafting using a drafting software

- Orthographic Projections
- Isometric Projections
- Development of surfaces of solids
- Free hand sketching of standard machine elements

Part II

Demonstration of 3-D Modeling and 3-D Printing

Creating a 3-D model of a simple component using a solid modeling software and manufacture using a rapid prototyping technique.

Text Books:

1. N. D. Bhatt and V. M. Panchal,'*Engineering drawing, plane and solid geometry'*,Charotor Publication House.
2. M.L.Dabhade, 'Engineering Graphics', *Vision Publications.*
3. Bethune, J.D., "*Engineering Graphics with AutoCAD 2013*", PHI Learning Private Limited, Delhi, 2013

VSEC201L Programming Skills in Java Language

Teaching Scheme:
Practical: 4 Hr/week
Credits: 2

Examination Scheme:
In-Sem: 25 Marks
End-Sem : 25 Marks

Course Objectives:

To facilitate the learners:

1. To explore the principles of object oriented programming
2. To apply object oriented programming concept for developing applications using Java
3. To make use of class, object and constructor for coding basic object oriented program
4. To handle built-in and user defined exceptions

Course Outcome:

By taking this course, the learner will be able to:

CO1: Apply basic object oriented constructs of Java such as class, object, data types, control flow, constructor for program development.

CO2: Develop readable and reusable code using inheritance and polymorphism CO3: Make use of exceptions using inbuilt classes and user defined exceptions

CO4: Develop application using object oriented programming language Java to solve real life problem

Suggestive List of Assignments

Assignment 0: Get acquainted with Windows/Linux Platform, Java environment, IDE installation, structure of basic Java program, compilation, debugging and execution of Java program.

Group A: Java Language Constructs

1. Write a MyDate class which has attributes as day, month and year. Create five objects of MyDate and display them.
2. Write a Java program to simulate the traffic signal by creating a class called "TrafficLight" with attributes for color and duration, and methods to change the color of the signal.
3. Write a Java program that displays the number of characters, lines and words in a text.
4. A circle has a radius. Its area can be calculated. The area is a double number. Its perimeter can be calculated as 2 . The perimeter is a double number. Given two circles one can find out which is large and which is small. Create two circles c1 and c2 with radius as 10 and 7 respectively. Calculate the area and perimeter of each. Compare two circles with each other and display which is large and which is small.
5. Design, code, test, and debug a user defined abstract data type 'Complex' in Java. Write a program using polymorphism to perform arithmetic operations of two complex numbers.
6. Write a Java program using inheritance to create a base class Sports with a method called play(). Create three subclasses: Football, Basketball, and Rugby. Override the play() method in each subclass to play a specific statement for each sport.
7. Write a Java program to create a class called Employee with methods called work() and getSalary(). Create a subclass called HRManager that overrides the work() method and adds a new method called addEmployee().

8. Write a Java program to create an interface Shape with the getArea() method. Create three classes Rectangle, Circle, and Triangle that implement the Shape interface. Implement the getArea() method for each of the three classes.

9. Write a Java program that works as a simple calculator to perform +, -,*, % operations. Handle any possible exceptions like divide by zero.

10. Write a Java program to implement Java Collection Frameworks like Stack and List.

11. Write a Java program to create a method that takes an integer as a parameter and throws an exception if the number is odd.

12. Write a Java program to create a method that takes a string as input and throws an exception if the string does not contain vowels.

Group B: Applications of Language Constructs

1. Create a student result database in Java. Calculate the grades of students. Decide criteria for best student and short-list students who satisfy the criteria.

a) A student has a roll No, name, marks in five courses and a grade. A student list has many students. If a student has grade equal or beyond 8, he is considered as a top band student.

b) Create at least ten students. From these, find all such students which satisfy the criteria of top band student. Create a list of such students and display the students in the list.

2. Create an application like a bookshop and maintain the inventory of books that are being sold at the shop. Reading material has a title and price. A book is a reading material. It has an ISBN number. A magazine is a reading material, it has a month of issue. A CD is a reading material, it has duration in minutes. Represent the above description as a generalization, specialization tree. Identify the parent class, its attributes, child class and their attributes. Implement and Test all of them.

3. Find appropriate class hierarchy, polymorphic behavior in applications like banking and implement it.

4. Model the HRD application using the concepts of inheritance, interface, polymorphism

5. Write a program to simulate the operations of a restaurant by creating appropriate classes and attributes and methods.

6. A company has many employees of different designations with different perks and deductions. When an employee is appointed, he is assigned with an employee Id, designation and perks. One can ask for the total salary of the employee and take-home salary of the employee. Identify a class/classes and relationships (is-a / has-a) from the above statement, identify the attributes, the data types, the behavior. Test your program for ten employees.

7. A vehicle has engine no and chassis number. It can be locked, unlocked. Every vehicle is movable (interface). It can be started, stopped, turned, accelerated, turned, and decelerated. A car is a vehicle. It has steering. An airplane is a vehicle. It has wings. A boat is a vehicle. It has a propeller. Identify a class/classes/interfaces from the above statement, identify the attributes, the data types, the behavior. Test your program for different types of vehicles.

8. Write a Java program to create a class called "Library" with a collection of books and methods to add, display and remove books, issue and return of books.

Group C problem statements address big real life problem solving. Students are expected to apply the learnt concepts to solve these problems. Students should choose any one of the following:-

1. Students should simulate real life problems/scenarios/applications. They are expected to make use of the appropriate constructs of Java language (Advanced Java concepts can be used)

2. Debugging and Feature enhancement / Alternative solution / testing / Code-refactoring of given problem statement. Students will be given a large and ready code. Students are expected to read and understand the code , be able to debug the code, be able to enhance the feature in given code, to be able to find alternative solutions, or refactor the given code.

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

VSEC201L Programming Skills in Python Language

Teaching Scheme:
Practical: 4 Hours/week
Credits: 2

Examination Scheme:

In Semester: 25 Marks

End Semester: 25 Marks

Prerequisites: Basic Mathematics.

Course Objectives:

Familiarize students with

1. The fundamentals of Python programming for logic building.
2. Appropriate data types, operators of Python language.
3. Conditional statements and loops in Python programming language.
4. List, strings, functions, and structures of Python programming language.

Course Outcomes:

Students will be able to:

1. Implement programs to solve real-life problems.
2. Implement Python programs using appropriate control structures, data type, operators and functions.
3. Execute Python programs.
4. Test Python programs for various inputs.

Suggested list of assignments:

1. Demonstration of installation and configuration of Anaconda and Spyder.
2. Accept and display class names and roll numbers of all the students from your class.
3. Create an empty dictionary for the film database, add films to the dictionary, update the key value and display all details of films.

4. Create an empty list of districts. Insert districts of Maharashtra, append districts of Gujarat, extend districts of Kerala, search for specific districts, access the first 5 districts, remove any one district and display all districts.

5. A) Create an empty tuple of cricket player names. Add a few player names to the tuple and display all the players in the tuple.

B) Swap positions of two players using tuples and display the initial and swapped contents of the tuples.

6. Perform string manipulation functions (concatenation, substring, comparison, palindrome)

    a. Display your first name

    b. Concatenate your last name to first name

    c. Find substring "as" in your concatenated string

    d. Compare your first name with your friends first name and specify if it's same

    e. Check if following strings are palindrome or not

        i. Your first name

        ii. nitin

        iii. madam

        iv. noon

        v. Your friend's name.

7. Create a text file and add course outcomes of this course. Implement file operations on it.

8. Calculate area of the circular cricket ground for a given radius using:

    a. formula

    b. Inbuilt function from numpy library.

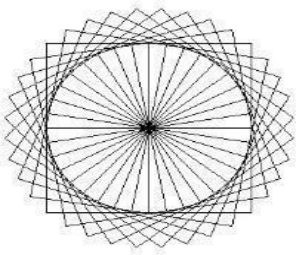
9. Plot sin(x) and cos(x) functions for values of x between 0 and pi. Use inbuilt libraries numpy and matplotlib.

10. Create a class named Person and assign values for name and age.

11. Implement a mini project based on String, function, directory, tuple and list.

Extra assignments:

1. Find out maximum and minimum salary of employee.
2. Calculate factorial using functions.
3. Generate fibonacci series using recursion.
4. Print multiplication table from 1 to 10
5. Design a two-player Rock-Paper-Scissors game
6. Python program to draw a circle of squares using Turtle



7. Generate a random number between 1 and 9 (including 1 and 9). Ask your friend to guess the number, then tell them whether they guessed too low, too high, or exactly right.
8. The company gives a dearness allowance 45% of basic salary and house rent allowance is 25% of basic salary. Write a python program to calculate gross salary.

Text books:

1. Reema Thareja, "Python Programming using problem solving Approach", Oxford University, Higher Education Oxford University Press; First edition (10 June 2017), ISBN-10: 0199480173
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Interdisciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
3. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and Updated for Python 3.2", Network Theory Ltd., 2011.

Reference Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016

(http://greenteapress.com/wp/think- python/)

2. Michael B. Feldman and Elliot B. Koffman. "Ada95: Problem Solving and Program Design", Addison-Wesley, Reading, Massachusetts, 1996.

3. Fredrik Johansson et al., "Mpmath: A Python library for Arbitrary-Precision Floating Point Arithmetic", December 2013. http://mpmath.org/.