Part A Introduction				
Program: Degree		Class : UG	Year: III	Session: 2023-24
Subject: BCA				
1	Course Code	S3-BCAA1D		
2	Course Title	Computer Graphics (Theory) (Group A - Paper-I)		
3	Course Type (Core Course/ Discipline Specific Elective/ Elective/ Generic Elective /Vocational/.....)	Discipline Specific Elective (DSE)		
4	Pre-requisite (if any)	None		
5	Course Learning outcomes (CLO)	**On successful completion of this course, the students will be able to:** 1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics. 2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. 3. Use of geometric transformations on graphics objects and their application in composite form. 4. Extract scene with different clipping methods and its transformation to graphics display device. 5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. 6. Render projected objects to naturalize the scene in 2D view and use of illumination models for this.		
6	Credit Value	4		
7	Total Marks	Max. Marks: 30 + 70	Min. Passing Marks: 35	

Part B- Content of the Course

No. of Lectures (in hours per week): 3 **Hrs. per week**
Total No. of Lectures: **60 Hrs.**

Module	Topics	No. of Lectures (1 Hour Each)
Unit-I	**Introduction to Computer Graphics:** Application of Computer Graphics, Interactive and Passive Graphics. **Graphic Systems:** Display Processor, Cathode Ray Tube (CRT), Random Scan vs Raster Scan, Color CRT Monitors, Direct View Storage Tubes, Flat Panel Display. **Input-Output Devices:** Input Devices, Trackball, Light Pen, Image Scanner, Output Devices, Plotters.	12

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Unit -II	**Scan Conversion a line:** Scan Conversion Definition, Scan Converting a Point, Scan Converting a Straight Line, DDA Algorithm. **Scan Conversion Circle:** Defining a Circle, Defining a Circle using Polynomial Method, Defining a Circle using Polar Coordinates Method, Bresenham's Circle Algorithm, Midpoint Circle Algorithm. **Scan Converting Ellipse:** Scan converting a Ellipse, Polynomial Method, Trignometric Method, Midpoint Ellipse Algorithm	12
Unit - III	**Filled Area Primitives:** Boundary Fill Algorithm, Flood Fill Algorithm, Scan Line Polygon Fill Algorithm. **2D Transformations:** Introduction of Transformation, Translation, Scaling, Rotation, Reflection, Shearing, Matrix Representation, Homogeneous Coordinates, Composite Transformation, Pivot Point Rotation. **2D-Viewing:** Window, Window to Viewport Co-ordinate Transformation, Zooming, Panning.	12
Unit -IV	**Clipping Techniques:** Clipping, Point Clipping, Line Clipping, Midpoint Subdivision Algorithm, Text Clipping, Polygon, Sutherland-Hodgeman Polygon Clipping, Weiler-Atherton Polygon Clipping. **Pointing & Positioning:** Pointing & Positioning Techniques, Elastic or Rubber Band Techniques, Dragging. **Shading:** Introduction of Shading, Constant Intensity Shading, Gouraud shading, Phong Shading.	12
Unit V:	**Animation:** Animation, Application Areas of Animation, Animation Functions. **3D Computer Graphics:** Three Dimensional Graphics, Three Dimensional Transformations, Scaling, Rotation, Rotation about Arbitrary Axis, Inverse Transformations, Reflection, Shearing **Hidden Surfaces:** Hidden Surface Removal, Back Face Removal Algorithm, Z-Buffer Algorithm, Painter's Algorithm, Scan Line Algorithm, Subdivision Algorithm.	12

Keywords/Tags: Graphic Systems, Input-Output Devices, Scan Conversion, 2D Transformations, 2D-Viewing, Clipping Techniques, **Shading,** Animation, 3D Computer Graphics, Hidden Surfaces.

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

Textbooks:

1. Hearn: Computer Graphics C Version, Pearson Education India; 2nd edition, 2002.
2. John Hughes, Andries van Dam, Morgan McGuire, David Sklar, James Foley: Computer Graphics: Principles and Practice, Addison-Wesley Professional, 3rd edition, 2013.
3. Zhigang Xiang, Roy Plastock: Computer Graphics, McGraw Hill Education, 2nd edition, 2006.
4. मध्य प्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें।

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Reference Book:

1. James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes: Introduction to Computer Graphics, Addison Wesley, 1993.
2. Chopra Dr. Rajiv: Computer Graphics, S Chand & Co Ltd.
3. Desai: Computer Graphics, PHI, 2008.
4. Asthana, R.G.S.: Computer Graphics for Scientists and Engineers, New Age International Pvt Ltd.

Suggested Digital Platforms Web links:

https://www.eshiksha.mp.gov.in/mpdhe
https://epgp.inflibnet.ac.in

Suggested equivalent online courses:

https://nptel.ac.in/courses/106103224
https://nptel.ac.in/courses/106106090

Suggested Continuous Evaluation Methods:

Maximum Marks : 100

Continuous Comprehensive Evaluation (CCE) : 30 Marks University Exam (UE): 70 Marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	30
External Assessment : University Exam Section Time : 03.00 Hours	**Section(A)** : Very Short Questions **Section (B) :** Short Questions **Section (C) :** Long Questions	70

Any remarks/ suggestions:

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Part A Introduction			
Program: Degree	Class :UG	Year: III Year	Session: 2023-24
Subject: BCA			

1	Course Code	S3-BCAA1Q	
2	Course Title	**Computer Graphics (Practical) (Group A - Paper-I)**	
3	Course Type (Core Course/ Discipline Specific Elective/ Elective/ Generic Elective /Vocational/.....)	**Discipline Specific Elective (DSE)**	
4	Pre-requisite (if any)	**None**	
5	Course Learning outcomes (CLO)	**On successful completion of this course, the students will be able to:** 1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics. 2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. 3. Use of geometric transformations on graphics objects and their application in composite form. 4. Extract scene with different clipping methods and its transformation to graphics display device. 5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. 6. Render projected objects to naturalize the scene in 2D view and use of illumination models for this.	
6	Credit Value	**2**	
7	Total Marks	Max. Marks: 100	Min. Passing Marks:35

Part B- Content of the Course

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Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 0-0-1		
Unit	**Topics**	**No. of Lectures** (2 Hours Each)
	List of Practicals: 1. Write a Program to draw basic graphics construction like line, circle, arc, ellipse and rectangle. 2. Write a program of Translation, Rotation, and Scaling using Composite Transformation. 3. Write a program to draw a Circle using midpoint implementation Method. 4. Write a program to draw Bezier curve. 5. Program to rotate a rectangle about its midpoint. 6. Program to clip a line using Liang Barsky Method. 7. Program to implement Standard Perspective Projection in 3-Dimensions. 8. Program to implement Parallel Projection in 3-Dimensions. 9. Write a Program to implement Digital Clock. 10. Write a Program to draw animation using increasing circles filled with different colors and patterns. 11. Write a Program control a ball using arrow keys. 12. Write a Program to implement Bouncing Ball in vertical direction.	**30**

Keywords/Tags:

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

Textbooks:

4. Hearn: Computer Graphics C Version, Pearson Education India; 2nd edition, 2002.
5. John Hughes, Andries van Dam, Morgan McGuire, David Sklar, James Foley: Computer Graphics: Principles and Practice, Addison-Wesley Professional, 3rd edition, 2013.
6. Zhigang Xiang, Roy Plastock: Computer Graphics, McGraw Hill Education, 2nd edition, 2006.
4. मध्य प्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें।

Reference Book:

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1. James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes: Introduction to Computer Graphics, Addison Wesley, 1993.
2. Chopra Dr. Rajiv: Computer Graphics, S Chand & Co Ltd.
3. Desai: Computer Graphics, PHI, 2008.
4. Asthana, R.G.S.: Computer Graphics for Scientists and Engineers, New Age International Pvt Ltd.

Suggestive digital platforms/ web links:

https://www.eshiksha.mp.gov.in/mpdhe
https://epgp.inflibnet.ac.in

Suggested equivalent online courses:

https://nptel.ac.in/courses/106103224
https://nptel.ac.in/courses/106106090

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	30	Viva Voce on Practical	70
Attendance		Practical Record File	
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/ Survey / Industrial visit)		Table work / Experiments	
	Total Marks : 100		

Any remarks/ suggestions:

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Theory Paper

Part A Introduction				
Program: Degree		Class :UG	Year: III	Session: 2023-24
Subject: BCA				
1	Course Code	S3-BCAA2D		
2	Course Title	Python Programming (Theory) (Group A - Paper-II)		
3	Course Type (Core Course/ Discipline Specific Elective/ Elective/ Generic Elective /Vocational/.....)	Discipline Specific Elective (DSE)		
4	Pre-requisite (if any)			
5	Course Learning outcomes (CLO)	On successful completion of this course, the students will be able to: 1.Develop and execute simple Python programs. 2. Structure a Python program into functions. 3. Using Python lists, tuples to represent compound data 4. Develop Python Programs for file processing		
6	Credit Value	4		
7	Total Marks	Max. Marks: 30 + 70	Min. Passing Marks: 35	

Part B- Content of the Course

No. of Lectures (in hours per week): 3 **Hrs. per week**
Total No. of Lectures: **60 Hrs.**

Module	Topics	No. of Lectures (1 Hour Each)
Unit - I	What is Python? WHY PYTHON? History, Features - Dynamic, Interpreted, Object oriented, Embeddable, Extensible, Large standard libraries, Free and Open source. Download &Python Installation Process in Windows, Unix, Linux and Mac, Online Python IDLE, Python Realtime IDEs like Spyder, Jupyter Note Book, PyCharm, Rodeo, Visual Studio Code, ATOM, PyDevetc, Data Types and Variables, Numbers, Operators Comments in Python. Input output operation in python.	No. of Lectures 14
Unit - II	Control Statements: Conditional control statements - if, If-else, If-elif-else, Loop control statements- for, while, Data Structure & Collection:-String, List, Tuple, Set, Dictionary, Comparison of List, Tuple and Set, Function in python, types of function in python, map, reduce, filter function. Lamda Function	10

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Unit - III	Importance of modular programming. What is module? Types of Modules - Pre defined, User defined. User defines module creation, OS, Date-time, math modules, organizing python project into packages, Types of packages - pre defined, user defined. Package v/s Folder, File and Directory handling in Python.	**12**
Unit - IV	Procedural v/s Object oriented programming, Principles of OOP - Encapsulation, Abstraction (Data Hiding), Polymorphism, Inheritance. Inner Classes. Exception handling and types of errors, try, except, finally, raise, and Need to Custom exceptions, Case studies, regular expression.	**12**
Unit - V	Multithreading and multiprocessing in python, Threading module, Creating thread - inheriting Thread class , Using callable object, Life cycle of thread, Single threaded application, Multithreaded application, Can we call run() directly? Need to start() method , Sleep() & Join(), Synchronization - Lock class - acquire(), release() functions. Garbage collection. Python Data Base Communications (PDBC), Introduction of Numpy, Pandas & MatPlotLib, Drawing plots.	**12**

Keywords/Tags: Open Source, Data Type, Module, List, Tuples, Directory

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1.Mark Lutz, Learning Python
2. Tony Gaddis, Starting Out With Python
3. Kenneth A. Lambert, Fundamentals of Python
4. JamesPayne,BeginningPythonusingPython2.6andPython32.
5. मध्य प्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें।

Reference Books:

1. Python Crash Course: A Hands-On, Project-Based Introduction to Programming (2nd Edition) Author: Eric Matthes.
2. **The Python Language Reference Manual** (version 3.2), Guido van Rossum, and Fred L. Drake, Jr. (Editor),ISBN: 1906966141,Network Theory Ltd, 120 pages (Revised November 2006

Suggestive digital platforms/ web links:

1. **www.javatpoint.com**
2. **www.w3school.com**
3. **www.python.org**
4. **https://www.tutorialspoint.com/python/index.htm**

Suggested equivalent online courses:

S.No.	Online Course	Duration	Plate-form

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01	Joy of Computing using Python https://nptel.ac.in/courses/106106182	12 Weeks	NPTEL
02	Complete Python course https://www.udemy.com/topic/python/	12 Weeks	Udemy

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks : 100

Continuous Comprehensive Evaluation (CCE) : 30 Marks University Exam (UE): 70 Marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	30
External Assessment : University Exam Section Time : 03.00 Hours	**Section(A)** : Very Short Questions **Section (B) :** Short Questions **Section (C)** : Long Questions	70

Any remarks/ suggestions:

Practical Paper

Part A Introduction

Program: Degree	**Class : UG**	**Year: III**	**Session: 2023-24**

Subject: Computer Application

1	**Course Code**	S3-BCAA2Q	
2	**Course Title**	**Python Programming (Practical) (Group A - Paper-II)**	
3	**Course Type (Core Course/ Discipline Specific Elective/ Elective/ Generic Elective /Vocational/.....)**	**Discipline Specific Elective (DSE)**	
4	**Pre-requisite (if any)**	To study this course, a student must have basic Logical, and analytical skills.	
5	**Course Learning outcomes (CLO)**	**On successful completion of this course, the students will be able to:** 1. Develop Simple programs in Pythong 2. Knowledge of conditional and loop statements. 3. Learning of Tuple, List, Directory in Python 4. Knowledge of Files and Ooops Concepts in Pyhton. 5. Introductory Knowledge of Pandas, PDBC and Numpy.	
6	**Credit Value**	**2**	
7	**Total Marks**	Max. Marks: 100	Min. Passing Marks:35

Part B- Content of the Course

Number of Lab Practical's (in hours per week): 2 Hours Per Week

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Total No. of Lab : 30 (Each Lab of 2 Hours)		
	Suggestive List of Practical **Students are required to write program(Code) in Python, execute and test it**	**No. of Labs: 30** (2 Hours Each)
	1. Write a program to demonstrate different number data types in Python. 2. Write a program to perform different Arithmetic Operations on numbers in Python. 3. Write a program to create, concatenate and print a string and accessing sub-string from a given string. 4. Write a python script to print the current date in the following format a. "Fri Oct 11 02:26:23 IST2019" 5. Write a program to create, append, and remove lists in python. 6. Write a program to demonstrate working with tuples in python. 7. Write a program to demonstrate working with dictionaries in python. 8. Write a python program to find largest of three numbers. 9. Write a Python program to construct the following pattern, using a nested for loop * * * * * * * * * * * * * * * * 10. Write a Python script that prints prime numbers less than20. 11. Write a python program to define a module to find Fibonacci Numbers and import the module to another program. 12. Write a python program to define a module and import a specific function in that module to another program. 13. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.	

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	14. Write a Python class to convert an integer to a roman numeral. 15. Write a Python class to reverse a string word by word.	

Keywords/Tags: Open Source, Data Type, Module, List, Tuples, Directory, Lops, Array

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1.Mark Lutz, Learning Python
2. Tony Gaddis, Starting Out With Python
3. Kenneth A. Lambert, Fundamentals of Python
4. JamesPayne,BeginningPythonusingPython2.6andPython32.
5. मध्य प्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें।

Suggestive digital platforms/ web links:

1. **www.javatpoint.com**
2. **www.w3school.com**
3. **www.python.org**
4. **https://www.tutorialspoint.com/python/index.htm**

Suggested equivalent online courses:

S.No.	Online Course	Duration	Plate-form
01	Joy of Computing using Python https://nptel.ac.in/courses/106106182	12 Weeks	NPTEL
02	Complete Python course https://www.udemy.com/topic/python/	12 Weeks	Udemy

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	30	Viva Voce on Practical	70
Attendance		Practical Record File	
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/ Survey / Industrial visit)		Table work / Experiments	
	Total Marks : 100		

Any remarks/ suggestions:

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Department of Higher Education

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