

COURSE CODE (CREDITS): 18B11CI315 (03)

MAX. MARKS: 35

COURSE NAME: Python Programming with Raspberry Pi

COURSE INSTRUCTORS: Dr. Vikas Baghel

MAX. TIME: 2 Hours

*Note: (a) All questions are compulsory.*

*(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

Q.No	Question	CO	Marks
Q1.	a) Describe the process of interfacing an ultrasonic distance sensor with a Raspberry Pi using Python for obstacle detection.	[CO1]	[2]
	b) Include a Python code snippet demonstrating the sensor's implementation.		[2]
	c) Discuss a real-world application, such as its use in home automation for smart object detection and obstacle avoidance.		[2]
	d) Explain how testing and debugging techniques can be applied to ensure the reliability and accuracy of sensor readings in advanced applications like autonomous navigation and robotics.		[2]
Q2.	You are tasked with creating a Python script to automate system status monitoring on a Raspberry Pi device connected to a network. The script should:	[CO2]	
	a) Use the <i>subprocess</i> module to execute the following Linux commands: <ol style="list-style-type: none"> <li>i. <i>df -h</i> to check disk usage and storage availability.</li> <li>ii. <i>uptime</i> to fetch the system's uptime and load averages.</li> </ol> b) Parse the output of these commands to extract relevant information and display the results in a user-friendly format. Your script should ensure the information is easy to understand and clearly organized.		[4] [3]
Q3.	a) Describe how you can calculate the distance of a point in a 3D space from a light source using Python.	[CO3]	[1]
	b) Create a GUI to input the coordinates of the light source and the point. The application should compute the Euclidean distance between these two points and display the result.		[2]
	c) Explain how Python's Tkinter and math libraries are used in the GUI design and calculation process.		[2]

<p><b>Q4.</b></p>	<p>a) Explain how sound can be integrated into games using Pygame.</p> <p>b) Describe how calculating reflecting angles works in a game when objects collide with surfaces.</p> <p>c) How do you compute the angle at which an object will bounce off a surface?</p> <p>d) Provide a Python code snippet that demonstrates adding sound effects and realistic physics to a game.</p>	<p>[CO4]</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[2]</p>
<p><b>Q5.</b></p>	<p>Explain the role of IP addresses, hosts, and ports in networking. How would you use Python to implement a basic chat server on a Raspberry Pi, allowing multiple clients to connect and exchange messages over the network? Provide the Python code for a simple chat server and client.</p>	<p>[CO5]</p>	<p>[5]</p>
<p><b>Q6.</b></p>	<p>Discuss how OpenCV can be integrated with Raspberry Pi to create a real-time video streaming system. Include code that captures video from the Raspberry Pi camera, processes the video, and streams it over the network. Provide an example of a use case for such a system.</p>	<p>[CO6]</p>	<p>[5]</p>