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Class: Final Year CSE-C

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Optimization Techniques and Algorithms Assignment 1

Questions:

Q1. Generate a random integer between 1 and 100 and print whether the number is odd or even.

Q2. Write a program to find out whether a given number is divisible by 5 or not.

Q3. Write a program to call a function that will generate an array of size n by d random numbers between LB and UB.

Q4. Repeat Q3 with n=10, d=2, LB= -100 and UB= 100 and plot the values on 2D surface.

Q5. Write a function that can provide the capacity of a gas production facility defined by the below expression if parameters m1 and m2 are passed as arguments.

$$f(m) = 61.8 + 5.72m_1 + 0.2623\times[(40-m_1)\times\ln(\frac{m_2}{200})]^{-0.85} + 0.087\times(40-m_1)\times\ln(\frac{m_2}{200}) + 700.23{m_2}^{-0.75}$$

Assigment Code:

Code 1:

```
% Generate a random integer between 1 and 100 and check whether it is odd
% or even
rand_num = randi([1, 100]);

fprintf('The random number is: %d\n', rand_num);

if mod(rand_num, 2) == 0
   fprintf('The number is even.\n');
else
   fprintf('The number is odd.\n');
end
```

Code 2:

```
% Check if a given number is divisible by 5 or not
num_5 = input('Enter a number: ');

if mod(num_5, 5) == 0
    fprintf('The number %d is divisible by 5.\n', num_5);
else
    fprintf('The number %d is not divisible by 5.\n', num_5);
end
```

Code 3:

```
% Function to generate random numbers
function random_array = generate_random_array(n, d, LB, UB)
    random_array = LB + (UB - LB) * rand(n, d);
end

random_array = generate_random_array(3, 4, 100, 200);

fprintf('The generated random array is:\n');
disp(random_array);
```

Code 4:

```
% Plot numbers

random_array = generate_random_array(10, 2, -100, 100);

figure;
scatter(random_array(:,1), random_array(:,2), 'filled');
xlabel('Dimension 1');
```

```
ylabel('Dimension 2');
title('2D Plot of Randomly Generated Points');
grid on;
```

Code 5:

```
% Calculating Gas Production
function capacity = gas_production_capacity(m1, m2)
    capacity = 61.8 + 5.72 * m1 + 0.2623 * ((40 - m1) * log(m2 / 200))^(-0.85) + 0.087 * (40 - m1) * log(m2 / 200) + 700.23 * m2^(-0.75);
end

parameters = generate_random_array(1, 2, 40, 100);

gas_production=gas_production_capacity(parameters(1,1), parameters(1,2));
fprintf("The gas production capacity is: %f", gas_production)
```

<u>Assignment Outputs:</u>

Code 1:

```
The random number is: 82
The number is even.
```

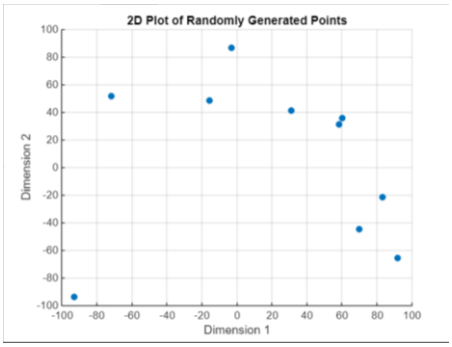
Code 2:

```
Enter a number:
13
The number 13 is not divisible by 5.
```

Code 3:

```
The generated random array is:
  190.5792  163.2359  154.6882  115.7613
  112.6987  109.7540  195.7507  197.0593
  191.3376  127.8498  196.4889  195.7167
```

Code 4:



Code 5:

```
The gas production capacity is: 346.635625
>>
```