The strength of concrete follows a Normal (Gaussian) distribution. The following table shows various concrete grades and their mean and standard deviation compressive strength.

You are required to do the following

1. Select a concrete type from the table below and write a Matlab script to perform the following:

1. Plot the probability density function (PDF) of the random variable that represents the strength of the material you selected. (5)
2. Plot the cumulative distribution function (CDF) of the random variable that represents the strength of the material you selected. (5)
3. Find the probability that the concrete strength is above 30 N/mm2 (10)
4. Select a range of values of the strength and find the probability that the

concrete strength is in that range. (10)

1. If the concrete material you selected is mixed with another material such that its strength is transformed according to the linear transformation 𝑦 = 𝑎 𝑠 + 𝑏 where s is the strength of the original material, y is the strength of the resulting material, and *a* and *b* are constants. Select any two values for *a* and *b*

and find the probability that the strength of the new material is above the

mean value of the original material. (10)

1. Explain each of your Matlab code use comments (starts with %) in the script

file (10)

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Grade of Concrete** | **Mean compressive strength (N/mm2)** | **Standard deviation compressive strength (N/mm2)** |
| 1 | M10 | 40 | 3.5 |
| 2 | M15 | 45 | 3.75 |
| 3 | M20 | 50 | 4 |
| 4 | M25 | 45 | 5 |
| 5 | M30 | 60 | 6 |
| 6 | M35 | 65 | 7 |
| 7 | M40 | 50 | 8 |
| 8 | M45 | 65 | 9 |
| 9 | M50 | 50 | 10 |
| 10 | M55 | 55 | 11 |