JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
Test-2 EXAMINATION – October 2017
M.Tech. (EE) 1st SEMESTER

COURSE CODE   : 14M31CE111   MAXM. MARKS: 25

COURSE NAME   : **Statistics for Environmental Engineers**

COURSE CREDIT: 03   MAXM. TIME: 1 Hr. 30 Min.

Note: All questions are compulsory. Marks are indicated against questions. Write concisely.
Carrying of mobile phone during examinations will be treated as case of unfair means.

Q.1. Two lakes A and B supply water to a city. The probability of lakes A and B becoming dry in summer is 0.2 and 0.1, respectively. Lake A can supply 60% of the city's full requirement when B fails (i.e., becomes dry), and B can supply 805 of the city's full requirement when A fails. The probability that both the lakes will become dry is 0.05. Calculate the probability that the city will have its full supply of water during summer, if there is a failure of the lake.   [5]

Q.2. What is total probability theorem? Explain its concept using a Venn diagram.   [5]

Q.3. Distinguish between probability density function (PDF) and cumulative distribution function (CDF) of a continuous random variable. Illustrate the difference using simple diagrams.   [5]

Q.4. The bearing capacity, Y, of a soil below a foundation is known to vary from 200 to 400 kN/m^2. Its PDF is given as

$$f_Y(y) = k\,(1 - y/400), \quad 200 \leq y \leq 400$$

$$= 0, \qquad \text{elsewhere},$$

where k is a constant. Determine the probability of failure of the foundation if the uniform load on the foundation is 300 kN/m^2.   [5]

Q.5. The probability density function of rainfall in a day during the monsoon season is given by

$$f_X(x) = 32\,e^{-4x} \qquad \text{for } x \geq 0.$$

Calculate the mean rainfall and variance in rainfall data.   [5]

x-------x