UNIVERSITY OF PETROLEUM & ENERGY STUDIES, DEHRADUN

Program	**B. Tech SCS**	**Semester**	**II**
Course	**Mathematics II**	**Course Code**	**MATH 1005**
Session	**Jan-May 2018**	**Topic**	**Probability & Statistics**

1. Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} k(x-9)(10-x), 9 \le x \le 10 \\ 0, \quad elsewhere. \end{cases}$$

Find the value of k. Hence, find the distribution function of X.

2. Justify the statement: a second order moment about any point is minimum when taken about mean.

3. A coin is tossed four times in succession. Find the probability of getting two heads.

4. A continuous distribution has probability density function $f(x) = 2e^{-2x}, 0 < x < \infty$. Calculate moment generating function, and hence find the mean and variance.

5. Find the moment generating function of Poisson distribution. Also find the first and second moment about mean.

6. In 10 independent thrown of a defective die, the probability that an even number will appear five times is twice the probability that an even number will appear 4 times. Find the probability that an even number will not appear at all.

7. If there is a war in every 15 years on the average, then find the probability that there will be no war in 25 years.

8. Calculate first four moments of the following data.

Values	30	40	50	60
Frequency	15	10	20	20

Hence find Mean, Variance, Skewness and Kurtosis.

9. Justify the statement: Moment generating function of sum of two independent variables is the product of their moment generating functions.

10. The first four moments of a distribution about $x = 2$ are $1, 3, 15$ and 40. Obtain the skewness and kurtosis and comment upon the nature of the distribution.