BBT 3106: PROBABILITY AND STATISTICS II

CAT I

INSTRUCTION: ANSWER ALL THE QUESTIONS

1. Tumaini Ltd is supplied with petrol once a week. The weekly demand, x hundred of litres, has the probability density function:

$$f(x)=\begin{cases} c(1-x)^9 & 0\le x\le 1 \\ 0, & otherwise \end{cases}$$

Where c is a constant.
Determine the:
(i) Value of c.
(ii) Mean of x;
(iii) Minimum capacity of the petrol tank if the probability that it will be exhausted in a given week is not to exceed 0.02. [10 Marks]

2. In a certain factory it is known that the time t days that a machine is out of service for repair is given by

$$f(t)=\begin{cases} \frac{1}{4}e^{-0.55t} & t\ge 0 \\ 0 & elsewhere \end{cases}$$

Determine the:

(i) Probability that the machine is never out of service;
(ii) Probability that the machine is not out of service for more than 6 days;
(iii) Probability that the machine is out of service up to 8 days;
(iv) Mean number of days that the machine is out of service. [10 Marks]