The Open University of Sri Lanka

B.Sc. /B.Ed. Degree, Continuing Education Programme

No Book Test (NBT) 2016/2017

Level 04 - Applied Mathematics

APU 2140/APE5140– Statistical Distribution Theory

Duration: - One Hour.

Date: - 20-05-2017	**Time: - 4.00 p.m. to 5.00p.m.**

Non programmable calculators are permitted. Statistical tables are provided.

Answer **All** Questions.

1.

Weight of a certain product (in grams) is normally distributed with mean μ and standard deviation 5g. According to the past experience, the probability that the weight of a randomly selected product is less than 60.2 g is 0.025.

    (i)   Find the value of μ.

    (ii)   Find the fraction of these products with weights exceeding 75g.

    (iii)   Suppose a dealer wants to buy a lot of 1000 from the above product. Out of these 1000 products, how many products would be within the range 63g to 73g?

2.

(a)   Suppose that X_1, X_2, X_3, X_4, are independent random variables described as

$$X_1 \sim N(3,4) \qquad X_2 \sim N(5,9) \quad X_3 \sim exp(3) \quad X_4 \sim gamma(3,3)$$

Find the following probabilities. Show your calculations and state the justifications clearly. You may use the gamma table at the end of the paper wherever necessary.

(i) $\Pr[(X_1 + 4) > 10]$

(ii) $\Pr[(2X_1 + 3X_2) < 25)]$

(iii) $\Pr[(X_3 + X_4) > 3)]$

(b)   In each of 30 races, the team A has a 60% chance of winning. What is the probability that the team A will win 15 or more races?

Left tail values of Standard Gamma Table

W - gamma(α,1)

This table contain the probabilities Pr(W ≤ w)

w	α					
	1	2	3	4	5	6
1	0.393469	0.264241	0.080301	0.018988	0.00366	0.000594
2	0.632121	0.593994	0.323324	0.142877	0.052653	0.016564
3	0.77687	0.800852	0.57681	0.352768	0.184737	0.083918
4	0.864665	0.908422	0.761897	0.56653	0.371163	0.21487
5	0.917915	0.959572	0.875348	0.734974	0.559507	0.384039
6	0.950213	0.982649	0.938031	0.848796	0.714943	0.55432