Form for Part I: ELEN7015 SAMPLE PAPER 2009

STUDENT NO: _____

Q1: What does the following line of Octave/Matlab code calculate that is relevant in teletraffic:

```
u = [1, cumsum(1:N)];
```

Q2: Define the term *teletraffic*.

Q3: What does the Erlang k distribution describe?

Q4: A random variable has mean m and standard deviation σ. Define the variance.

$$v =$$

Q5: The subscribers to a concentrator are described collectively by calling rate λ and a call completion rate μ. What is the average call gap?

Q6: Define the term *Markov arrival process*.

Q7: Draw the Markov model for a switching system with four outgoing lines and no queue. Insert sybmols for the rate parameters for all states.

Q8: What underlying assumptions differentiate the Erlang B from the Erlang C distributions?

Q9: What queueing system characteristics for the last field in the Kendall notation M/G/1/4–LCFS signify.

Q10: What is the utilisation of a queueing system?

Q11: What is a deterministic arrival process?

Q12: A M/M/1 queue has arrival and service rates λ and μ. What function of λ and μ gives a measure of the level of demand on the system

Q13: List two properties of queueing systems in consisting of parallel paths?

1. .....
2. .....

Q14: A call centre has 8 agents and can queue up to 12 callers. What standards state distribution equation describes this system?

Q15: What is the area of application of the Pollaczek-Khintchine equations?

Q16: A call is routed through N switches each of which bas a blocking probability $B_n, n = 1, \ldots, N$. Ti is proposed that teh overall blocking probability can be calculated from

$$B = \sum_{n=1}^{N} B_n$$

What underlying assumption must be true for this to be valid?

Q17: How does overflow traffic differ from normal first-choice routed traffic in a switched circuit networks?

Q18: A bus access network system uses a 30 channel multiplex and has 300 users connected to 6 stations. What is a simple model that could be used in traffic calculations

Q19: A computer programme to do calculations on queueuing systems assumes that $\lambda = 1$ and accepts μ as an imput parameter. Results for the delay T and waiting time W are obtained. What value of μ must be input if the actual $\lambda = 0.02$.

Q20: Why is a slotted TDMA radio access system better than one without constraints on access?