STUDENT NO: _____

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

```
u = sum(-log(rand(4,1000)))
```

Q2: Define the term *statistical equilibrium.*

Q3: What does the Poisson distribution describe?

$$P(k,t,\lambda) = \frac{(\lambda t)^k e^{-\lambda t}}{k!}$$

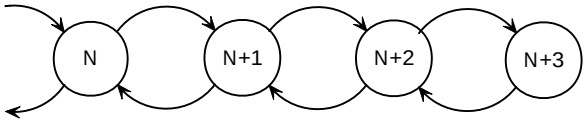
Q4: A random variable has mean m and standard deviation σ. Define the coefficient of variation.

$$C =$$

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

Q6: Define pure chance traffic

Q7: The part of the Markov model for a switching system with N outgoing lines and a three-call queue is shown. Insert the rate parameters for states $k > N$.



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

Q9: What queueing system characteristics do the fourth and fifth fields signify in the Kendall notation A/B/C/D–E .

Q10: Why is a queue describe as unstable if the parameter $\rho = \lambda/\mu$ approaches 1?

Q11: What does M/D/3 signify?

Q12: A general arrival process has: (Mark the answers right or wrong)

1. A gaussian distribution
2. A known mean
3. An Erlang k distribution
4. A known standard deviation

Q13: List two properties of queueing systems in cascade?

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

Q14: Why is Little's formula an important result in queueing theory?

Q15: Define the term *residual service time*.

Q16: A call is routed through two switches each of which can be assumed to carry pure chance traffic. The switches have blocking probabilities of 0.01 and 0.015 respectively. What is the blocking probability that the end user will experience?

$$B =$$

Q17: A single first choice route has N channels and an overflow route has J channels. The offered traffic is A. The proposal is that the Erlang B formula can be used to calculate the blocking probability. Justify or refute the proposal.

Q18: Define the term *model* as used in teletraffic engineering.

Q19: A computer programme to do calculations on queueuing systems assumes that $\lambda = 1$ and accepts ρ as an input parameter. Results for the queue length L and waiting time W are obtained. How must the results. $L,\ W$ be scaled for an actual $\lambda = 0.02$.

Q20: What is the significance of Palm's identity for calculating the mean value of a non-negative random variable?

$$m_i = \int_0^\infty X^i p_x(X)\,dx = \int_0^\infty iX^{i-1}[1 - P_x(X)]\,dx$$