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12SCN24

Second Semester M.Tech. Degree Examination, June/July 2014
Switching and Statistical Multiplexing in Telecommunications

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. With the help of a neat diagram, explain the simple telephone communication with the equation for instantaneous current and instantaneous flux in microphone and earphone respectively. **(10 Marks)**

b. The channel interfaces in a point – to –point communication system attenuate the signal by 3dB each. The channel has a loss of 30 dB. If the received signal is to be amplified such that the overall loss is limited to 20dB, estimate the amplifier gain. **(05 Marks)**

c. A 1000 – line exchange is partly folded and partly nonfolded. Forty percent of the subscribers are active during peak hour. If the ratio of local to external traffic is 4 : 1, estimate the number of trunk lines required. **(05 Marks)**

2 a. List the advantages and disadvantages of digital telecommunication. **(05 Marks)**

b. List and explain design considerations in touch tone dial telephone. **(08 Marks)**

c. Estimate the number of cross-points required to design an exchange that supports 500 users on a nonblocking basis and 50 transit, outgoing or incoming calls simultaneously. **(07 Marks)**

3 a. What are the differences between common control and direct control? **(04 Marks)**

b. What is centralized SPC? With the help of diagram, discuss the various modes of centralized SPC. **(10 Marks)**

c. A three –stage network is designed with the following parameters : M = N = 512, p = q = 16 and $\alpha = 0.7$. Calculate the blocking probability of the network if – i) s = 16, ii) s = 24 iii) s = 31 using the Lee equation. **(06 Marks)**

4 a. Show that if the P and V operations are not executed atomically, the mutual exclusion may be violated. **(06 Marks)**

b. Determine the switch advantage ratio of a three – stage network with N inlets and N outlets for the cases when i) N = 128 and ii) N = 32, 768.0 **(04 Marks)**

c. Explain distributed SPC in detail. **(10 Marks)**

5 a. What is Nyquist theorem? Explain. **(06 Marks)**

b. Discuss quantization noise and signal to quantization noise ratio. **(08 Marks)**

c. The threshold of hearing or the reference level for the minimum discernible sound is internationally agreed upon as 10^{-12} W/m^2. The threshold of pain is 130 dB above this threshold of hearing. What is the actual power level at the threshold of pain? **(06 Marks)**

6 a. What is the minimum sampling frequency required for a signal with a frequency range of DC 15 KHz if it is –

i) Band limited between 1 KHz and 10 KHz

ii) Passed through a low pass filter which has a cut off frequency of 5 KHz. **(06 Marks)**

b. What are vocoders? Discuss all the types of vocoders. **(06 Marks)**

c. List and explain the characteristics of speech signals contributing to the redundancy. **(08 Marks)**

7 a. Define the terminologies : CCS, CS, CCR, BHCA, Erlang. **(05 Marks)**

b. What do you mean by delay systems? Explain. **(05 Marks)**

c. A call processor in an exchange requires 120 ms to service a complete call. What is the BHCA rating for the processor? If the exchange is capable of carrying 700 Erlangs of traffic, what is heft call completion rate? Assume an average call holding time of a two minutes. **(05 Marks)**

d. In an exchange, the calls arrive at the rate of 1100 calls per hour, with each call holding for a duration of three minutes. If the demand is served by a trunk group of 50 lines m determine the GOS. **(05 Marks)**

8 a. State and prove steady state behavior of a telecommunication switching system when modeled as a B – D process. **(10 Marks)**

b. The traffic statistics of a company using a PABX indicates that 180 outgoing calls are initiated every hour during working hours. Equal number of calls comes in. Each call lasts for 200 seconds on the average. If the GOS required is 0.05, determine the number of lines required between the PABX and the main exchange. **(05 Marks)**

c. During a 2 – hour busy period, 2400 calls arrive at an exchange. Average holding time per call is two minutes. What is the traffic load in i) Erlangs and ii) in CCS? **(05 Marks)**

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