Indian Institute of Engineering Science and Technology, Shibpur

M.E. (ETC) 2nd Semester Final Examination, May 2014

TELECOMMUNICATION SWITCHING SYSTEMS

(ETC 1040)

Full Marks – 70.   Time – 3 Hrs.

The questions are of equal value.

Two marks are reserved for neatness and presentation in each half

Answer any six questions taking three questions from each half

First Half
(Answer any three questions)

1. (a) Contact bounce can be a problem in DTMF telephone, i.e., a single press of a push button may be interpreted as more than one press. How does the DTMF dial design take this into account?
   (b) Show that the harmonic frequencies of any two adjacent base frequencies in DTMF telephone cannot match within the first 15 harmonics.
   If the transmitted power of the low band frequency signal from a DTMF telephone is 1mW, what should be the power in mW of the high band frequencies?
   (c) Estimate the number of cross-points required to design an exchange that support 500 users on a non-blocking basis and 50 transit, outgoing or incoming calls simultaneously.

   (2+4+5)

2. (a) Discuss the general structure of an N x N three stage switching network for reduction of blocking probability & number of switching elements. How the blocking probability of this network can be estimated with the help of Lee's graph?

   (b) A three stage network is designed with the following parameters:
   M = N = 512, p = q = 16 and alpha = 0.7, [Symbols have their usual significance.]
   Calculate the blocking probability of the network if , (a) s = 16, (b) s = 24 (c) s = 31
   using the Lee's equation. Determine the inaccuracy of the result in case (c).   (9+2)

3. (a) Explain briefly with suitable exhibits the input controlled and output controlled time division space switch(TDSS).What is the main advantage of the output controlled TDSS over input controlled TDSS ?
   (b) Why differential coding technique is chosen for digitizing speech waveforms? Discuss 'Delta Modulator Scheme' and 'Digital DPCM encoder' in the light of the characteristics of the speech signals that contribute to the above.   (5+6)

4. (a) Classify the data networks according to their geographical coverage & mention their uses. Distinguish clearly Voice traffic & Data traffic.

(b) Discuss briefly 'Circuit switching' and 'Store and forward (S&F) switching' techniques for Data Transmission with the help of suitable exhibits. How do you calculate the i) time taken for data transfer in a circuit switched connection and ii) data transmission delay in Store & forward switched connection. **(4+7)**

5. Write Short Notes on the followings **(any two):** **(11)**
a) Centralised SPC.
b) Line Coding: Significance & Various Techniques.
c) Time Multiplexed Time Switching
d) Vocoders.

Second Half
(Answer any three questions)

6. Derive the steady state equations of a B-D process for modeling of telecommunications system . What is a renewal process and how does it differ from B-D process ? **(8+3)**

7. (a) Discuss briefly with mathematical interpretation the 'Lost Calls Cleared System' for finite subscribers.

(b) In a telephone system, there are 20 servers and 100 subscribers. On an average, there are 10 busy servers at any time. The probability of all the servers being busy is 0.2. Calculate the grade of service assuming (i) Erlang traffic and (ii) Engest traffic. Derive the necessary equations with proper justification. **(9+2)**

8. Describe the protocol architecture of ISDN , according to the OSI reference model. How rate adaptation can be done on B and D channels of ISDN ? **(6+5)**

9. Explain how flooding can be used to implement packet switching . How hop count improves flooding ? What is random routing? **(5+3+3)**

10.. Describe the LAN architecture model using OSI model. How information to and from MAC layers are transmitted ? **(6+5)**

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