B.E. (ETC) Final Examination, 2013
Part-IV, 8th Semester

TELECOMMUNICATION SWITCHING
(ET 803)

Full Marks – 70. Time – 3 Hrs.

The questions are of equal value

Answer any FIVE questions.

Answer should be brief and to the point.

1 (a) Explain the theory of a Carbon granule microphone. What is the importance of steady current flowing through a transmitter? Justify your answer with mathematical analysis.

(b) Is the output of a telephone transmitter free from harmonic distortion? What steps are taken to keep it a minimum value? Is the harmonic distortion affected by a change in the energizing current?

(c) Why is it necessary to keep the magnetic diaphragm in an earphone displaced from its unstressed position? How is this achieved? What happens if the ratio ϕ/ϕ_0 is not very small in the case of an earphone? What is the significance of sidetone in a telephonic conversation? 5+5+4

2 (a) Describe with the help of suitable exhibits the principle of step by step switching.

(b) Explain briefly the design parameters of a generic switching system.

(c) Design a 100-line Strowger exchange using line finders to achieve a blocking probability less than 0.05. Calculate the design parameters. Assume that the probability that a subscriber is active is 0.1. 6+4+4

3 (a) What are the design considerations for touch tone signaling? Briefly discuss about telephone networks in the light of attenuation and delay characteristics.

(b) Describe the working principle of crossbar switching with the help of 3 x 3 crossbar switching.

(c) What is the significance of diagonal crosspoint matrix? How can the number of crosspoint switches be reduced by designing blocking configurations? 5+4+5

4 (a) What do you understand by the term "Stored Program Control"? Explain the centralized SPC in the light of standby mode, synchronous duplex mode and load sharing mode. Why redundant configuration is chosen?- Justify showing the availability of a single processor system and dual processor system.

(b) Given that MTBF = 2000 hours and MTTR = 4 hours, calculate the unavailability for single and dual processor systems. 12+2

5 (a) Do you consider the digital speech transmission is superior to analog speech transmission system? Justify otherwise also.

(b) What is the difference between PAM and PCM modulation scheme? Derive an expression of signal-to-quantization noise in PCM.

(c) Show that a NRZ train of square pulses consist of only odd harmonics of the fundamental frequency.

(d) A 7-bit uniform PCM system has a bit rate of 56 kbps. Calculate the signal-to-quantization noise ratio (SQR) when input is a sine wave covering the full dynamic range. Calculate the dynamic range of the sine wave input if the SQR is to be atleast 30 dB. 3+4+4+3

6 (a) Describe the working principle of Basic Time Division Space Switch (TDSS) in the light of Input controlled TDSS and Output controlled TDSS.

(b) How do you define Time Division Time Switching? In how many ways a TDTS may be controlled? Furnish switching structure and equivalent circuit of a basic TDTS. 7+7

7 (a) What do you mean by the Time and Ensemble Average of a stochastic process? How do you interpret memoryless distribution in regard to Markov Processes?

(b) Derive appropriate mathematical expressions that govern the steady state behavior of a telecommunication switching system when the system is modeled as Birth Death Process.

(c) In an exchange the calls arrive at the rate of 1100 calls per hour with each call holding for duration of three minutes. If the demand is serviced by a trunk group of 50 lines determine the GOS. 6+6+2

8 Write short notes on (any two):

(a) Store and Forward Switching

(b) ISO-OSI Reference Level

(c) Vocoders

(d) Network and Protocol Architecture of ISDN 7+7