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Printed Pages : 4 **TEN – 801**

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 0295 Roll No.

B. Tech.

(SEM. VIII) EXAMINATION, 2008-09

ADVANCED COMMUNICATION SYSTEMS

Time : 3 Hours] *[Total Marks : 100*

Note : Attempt all questions.

1 Attempt any four of the following : 5×4

(a) Describe each of the BORSCHT functions of a subscriber line interface circuit.

(b) Enlist the Touch Tone Signaling Frequency.

(c) What is the main advantage of the crossbar switching system over the step-by-step switching system.

(d) Explain the term nonblocking as applied to a cross point switch matrix.

(e) A DS1 digital signal contains 24 eight bit PCM channels TDM on a cable. One synchronizing bit per frame is supplied and the sampling rate is 8 kHz. Determine the bit rate on the cable.

(f) Find the Via net loss of a trunk circuit that involves 2000 km of microwave relay circuits with an average velocity of propagation of 299 Mm/s. What is the round trip delay on the circuit ?

2 Attempt any **four** of the following: 5×4

(a) Explain one form of facsimile transmitter and explain how the scanning spot is obtained.

(b) Explain the term raster scanning as applied to fascimile.

(c) The index of cooperation of a fascimile machine is 352. Its speed of rotation is 60 rpm and the scanning pitch is 5/16 mm. Find the theoretical bandwidth required for the transmission channel.

(d) In the US NTSC system the aspect ratio is 4/3, the total number of line periods per frame is 525, and the number of suppressed lines is 40 per frame. Find the picture height and width in number of pixels. Also find the number of pixels periods in a line period.

(e) Draw a block diagram of a colour TV receiver sharing all the important functions from the tuner to the picture tube.

(f) Write a short note on High Definition Television.

3 Attempt any **two** of the following: 10×2

(a) Draw a functional block diagram of a pulse radar and describe the function of each block.

(b) (i) Calculate the maximum range of a radar system which operate at 3 cm with a peak pulse power of 500 kW. If its minimum receivable power is 10^{-13} W, the capture area of its antenna is 5 m^3 and the radar cross sectional area of the target is 20 m^2.

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(ii) An MTI radar operates at 5 GHz with a pulse repetition frequency of 800 PPS. Calculate the lowest three blind speeds of this radar.

(c) Write short notes on the following :

(i) Multiple access techniques

(ii) Mobile communication standards as GSM, IS-95, UMTS.

4 Attempt any **two** of the following : 10×2

(a) State and explain Kepler's laws in relation to artificial satellites orbiting the earth. What are the important system necessary in a geosynchronous satellite ?

(b) (i) An earth station at latitude 20° S and longitude 30° W is working into a geostationary satellite situated at longitude 30° E. Determine the look angles and the range.

(ii) The coordinates for an earth station are 43° South, 30° east. Calculate limits of visibility.

(c) (i) For a Satellite Communication Channel, the uplink C/N_0 ratio is 88 dBHz and the downlink value is 78 dBHz. Calculate the overall C/N_0 ratio in dBHz.

(ii) The required E_b/N_0 ratio for a digital satellite link is 9.6 dB and the bit rate is 1.544 Mbps. Calculate the required C/N_0 ratio.

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5 Attempt any two parts of the following : 10×2

(a) Explain the difference between a step index fiber and a graded index fiber. Explain how mode coupling can occur with losses.

(b) Explain the term dispersion as applied to optical fibers. A single mode fiber operating at 1.5 μm is found to have a material dispersion of 2.81 ns and a wave guide dispersion of 0.495 ns. Find the maximum allowed bit rate for the fiber with a pulse width of 2.5 ns

(c) Write short notes on the following :

(i) Photo detectors

(ii) Fiber optic communication link.