

**R09**

Code No: 09A60404

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech III Year II Semester Examinations, November/December-2013

DIGITAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions  
All questions carry equal marks

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- 1.a) Draw the model of a digital communication system and explain each block in detail.  
b) Explain the Sampling theorem in detail. [8+7]
- 2.a) Derive an equation for quantization noise in PCM.  
b) Explain the Delta Modulation (DM) with block diagrams. Discuss the disadvantages of DM. [7+8]
- 3.a) Explain the non-coherent FSK technique? Also explain the bandwidth and power requirements of it.  
b) What is DPSK? Explain the DPSK Transmitter in detail. [8+7]
- 4.a) Write a short note on eye diagram?  
b) Obtain the probability of error for integrate and dump receiver. [7+8]
- 5.a) Define average information and mutual information? Give the properties of each.  
b) A scanner converts black and white document line by line, into binary transmission. The scanner produces source data comprising symbols representation runs of up to six similar image pixel elements with the probabilities shown below.

Number of consecutive pixels	1	2	3	4	5	6
Probability of occurrence	0.2	0.4	0.15	0.1	0.06	0.09

Determine the average length of a run (in pixels) and corresponding effective information rate for this scanner when the scanner traversing 1000 pixels. [8+7]

- 6.a) Explain the decoding operation of the cyclic codes.  
b) A linear block code with minimum distance  $d_{min}$  can correct up to  $[(d_{min}-1)/2]$  errors and detects up to  $d_{min}-1$  errors in each codeword, where  $[(d_{min}-1)/2]$  denotes the largest integer number greater than  $(d_{min}-1)/2$ . [8+7]
- 7.a) Explain the decoding of convolutional code using viterbi algorithm.  
b) Explain the encoding of the convolutional codes using trellis diagram with an example. [7+8]
- 8.a) With the help of a block diagram explain the direct sequence spread spectrum technique.  
b) Explain the synchronization in spread spectrum systems. [8+7]

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