



RM-7147

B. E. - III (Sem. VI) (I. T.) Examination

May / June - 2010

Elements of Information Theory

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दशावैल निशानीवाणी विगतो उत्तरवडी पर अवश्य लखवी.
Fillup strictly the details of signs on your answer book.

Name of the Examination :
B. E. - 3 (Sem. 6) (I. T.)

Name of the Subject :
Elements of Information Theory

Subject Code No. : 7 1 4 7 Section No. (1, 2,.....): 1&2

Seat No. :

Student's Signature

- (2) Answer the two sections in separate answer books.
- (3) Figures to extreme right indicate maximum marks.
- (4) Make necessary assumptions and clearly mention them, if required.
- (5) Support your answers with block diagram or neat sketches, if required.

SECTION - I

- 1 (a) Attmpt the following questions : 10
 - (i) What do you mean by homophones ?
 - (ii) What is Nonrepudiation ?
 - (iii) Define Morse code.
 - (iv) Define the amount of information.
 - (v) What is trap-door one-way function ?
 - (vi) List out the different substitution techniques.
 - (vii) Define Entropy.
 - (viii) What is One Time Pad ?
 - (ix) What is denial of service ?
 - (x) What do you mean by data integrity ?
- (b) Discuss the passive attacks and active attacks. 4
- (c) Explain Shannon's Theorem with Channel Capacity. 4

- 2** Attempt the following questions : (any four) **16**
- (1) Explain monoalphabetic cipher with example.
 - (2) Derive the formula for the fourier transform. With the help of this equation find the value of amplitude spectral density for the $V(t) = \sin \omega_0 t$.
 - (3) Explain working of Hill Cipher.
 - (4) What is digital signature ? Explain its properties.
 - (5) Explain convolution theorem.

- 3** Answer the following : **16**
- (a) Describe the algorithm for coding to increase average information per bit with example. **8**

OR

- (a) Explain Normalized power. Also explain normalized power in a fourier expansion. **8**
- (b) For the RSA algorithm given plaintext is, **6**

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Calculate the following :

- (a) Find the prime factors.
 - (b) Find Encryption, Decryption key.
 - (c) Find out cipher text.
- Find plain text from the cipher text.
- (c) Explain the term "Encryption scheme is unconditionally secure". **2**

SECTION - II

- 4** (a) Answer the following questions : **10**
- (1) Define probability with example.
 - (2) Plot clock wave form for biphase data.
 - (3) Define encoding and its types.
 - (4) "JPEG is image compression technique and MPEG is video compression technique" justify your answer.
 - (5) Draw the waveform for $f_s > 2f_m$ and $f_s < 2f_m$ based on sampling theorem.
- (b) Answer the following questions : **10**
- (1) Explain sampling theorem and its effect on low-pass signal. **6**
 - (2) Briefly describe the joint probability of related and independent events. **4**

5	Answer the following questions :	15
(1)	Explain signal determination with noise described by a distribution function.	5
(2)	Explain in detail power spectral density of a sequence of random pulse.	10
OR		
(2)	(i) Explain noisy communication channels in brief.	4
	(ii) Discuss source encoding with example.	6
6	(a) Explain data compression in detail.	8
	(b) Explain Autocorrelation.	7
OR		
(b)	Write note on MPEG standard.	7
