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RM-7147-R

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

May / June – 2010

Elements of Information Theory

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

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
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**

ATTACTXATXSEVEN

Calculate the following :

(a) Find the prime factors.

(b) Find Encryption, Decryption key.

(c) Find out cipher text.

Find plain text from the cliper 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 fs > 2fm and fs < 2fm 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**