## Vivekananda College of Engineering & Technology, Puttur [A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®]

Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08

Rev 1.10

FC

19/10/2020

## CONTINUOUS INTERNAL EVALUATION- 1

Dept: EC Sem / Div: V Sub: Information Theory and Coding

Date: 20/10/2020 Time: 2:30-4:00pm Max Marks: 50 Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

Q N		Questions			Marks	RBT	COs
(T/2)		PART A					
l a Derive an ea long indepen	xpression for a ident sequence.	verage inform	ation content	of symbols in	3	L1	COI
	State diagram o	5.5 K	5 B	e; iii) Entropy	9	L3	COI
of source.							
C C1 1 1						144491111	
$H(S^n) = nH(S^n)$	S).	extension of			6	L2	CO1
H(S") = nH(S d Consider an 1/4, 1/8, 1/8, o 2"d extension	e entropy of $n^{th}$ S). alphabets $x_1$ , $x_2$ , determine the end of the source	$x_3, x_4$ with theintropy of the set $H(S^2)=2H$	r respective pr ource and sho I(S) by listing	obabilities ½,	7	L2	
H(S") = nH(S d Consider an 1/4, 1/8, 1/8, o 2"d extension	S). alphabets $x_1$ , $x_2$ , determine the erm of the source	$x_3, x_4$ with theintropy of the set $H(S^2)=2H$	r respective pr ource and sho I(S) by listing	obabilities ½,			
H(S") = nH(S d Consider an ¼, 1/8, 1/8, 0 2"d extension extension syr	s). alphabets x <sub>1</sub> , x <sub>2</sub> , determine the endered of the source mbols and their imum number of instantaneous co (Where 'W' repr	(X <sub>1</sub> ,X <sub>4</sub> with theintropy of the see H(S <sup>2</sup> )= 2H respective proform OR  f symbols, 'r' in de such that Wesent set of co	r respective prource and should by listing babilities.  In the coding all the cod	robabilities ½, w that for the g all the 2 <sup>nd</sup> lphabet for 1, device			COI
H(S") = nH(S) d Consider an 1/4, 1/8, 1/8, 0 2"d extension extension syr a Find the min devising an in such a code, b State Kraft N	s). alphabets x <sub>1</sub> , x <sub>2</sub> , determine the end of the source mbols and their imum number of instantaneous co (Where 'W' reproperation of the source)	(X <sub>1</sub> ,X <sub>4</sub> with theintropy of the size H(S <sup>2</sup> )= 2H respective proform OR  If symbols, 'r' is de such that We resent set of collity property.	r respective prource and shource and should by listing babilities.  In the coding alverse to the coding alverse to the words of le	robabilities ½, w that for the g all the 2 <sup>nd</sup> lphabet for 1, device	7	L2	CO1
H(S") = nH(S) d Consider an 1/4, 1/8, 1/8, 6 2"d extension extension syr  a Find the mindevising an insuch a code, b State Kraft M c Consider the S = {A, B,C, Find the code efficiency.	S).  alphabets x₁, x₂, determine the end of the source impols and their imum number of the source imum number of the end of their imum number of the end	ox <sub>3</sub> ,x <sub>4</sub> with theintropy of the size H(S <sup>2</sup> )= 2H respective profession of the symbols, 'r' in the such that Wesent set of collity property. The with probability property is with probability annon-fano all	r respective prource and shource and shource and should be abilities.  In the coding allowing the coding allowers of lewords of lewords of lewords of lewords and a legorithm and a	robabilities ½, we that for the g all the 2 <sup>nd</sup> lphabet for ), device ngth: 1, 2,)	7	L2	CO2
H(S") = nH(S) d Consider an 1/4, 1/8, 1/8, 6 2"d extension extension syr  a Find the min devising an in such a code, b State Kraft M c Consider the S = {A, B,C, Find the code efficiency, d Apply shanne	S).  alphabets $x_1$ , $x_2$ , determine the endermine of the source of t	ox <sub>3</sub> ,x <sub>4</sub> with theintropy of the size H(S <sup>2</sup> )= 2H respective profession or	r respective prource and shource and shource and shource and shource and shource and shource and the coding allowed and the coding allowed and the coding allowed and the coding allowed and the coding and a contract binary and a contract binary	robabilities ½, we that for the g all the 2 <sup>nd</sup> lphabet for ), device ngth; 1, 2,)	7 6 5	L2 L2	CO2 CO2 CO2
H(S") = nH(S) d Consider an 1/4, 1/8, 1/8, 0 2"d extension extension syr  a Find the min devising an in such a code, b State Kraft M c Consider the S = {A, B,C, Find the code efficiency, d Apply shanne set of messag	s).  alphabets x <sub>1</sub> , x <sub>2</sub> ,  determine the end of the source  mbols and their  imum number of  instantaneous co  (Where 'W' reproduced in the source  following source  D,E,F P = {0  words using Sleen's encoding all  on's encoding all	ox <sub>3</sub> ,x <sub>4</sub> with theintropy of the size H(S <sup>2</sup> )= 2H respective profession or	r respective prource and shource and shource and shource and shource and shource and shource and the coding allowed and the coding allowed and the coding allowed and the coding allowed and the coding and a contract binary and a contract binary	robabilities ½, we that for the g all the 2 <sup>nd</sup> lphabet for ), device ngth; 1, 2,)	7 6 5 6	L2 L2 L1 L2	CO1 CO2 CO2 CO2

Prepared by: Naveena C

8 - flot 2020

## Vivekananda College of Engineering & Technology,Puttur [A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®] Affiliated to VTU, Belagavi & Approved by AICTE New Delhi

CRM08

Rev 1.10

EC

19/10/2020

## CONTINUOUS INTERNAL EVALUATION- 1

PART B				
3 a For the Markov source shown below, Find		10		
i) the stationary distribution		10	L.	3 CC
ii) state entropies				
iii) source entropy				
iv) $G_1$ , $G_2$ and show that $G1 \ge G2 \ge H(s)$ .				
2/3				
A 1 B 2/3 A	1/3			
b Mention different properties of entropy and prove extremal pr				
The properties of entropy and prove extremal properties of entropy and entropy and entropy and entropy and entropy and entropy entropy and entropy entropy and				
dashes to transmit letters of English and the symbols of	dots and	8 7	L2 L2	CO1
dashes to transmit letters of English alphabet. The dash is rep by a current pulse of duration 2ms and dot of 1ms. The proba dash is half as that of dot. Consider 1ms duration of gap is between the symbols. Calculate  i) Self information of a dot and dash. ii) Average information content of a dot delegated.	dots and presented			200
dashes to transmit letters of English alphabet. The dash is replay a current pulse of duration 2ms and dot of 1ms. The probable is half as that of dot. Consider 1ms duration of gap is between the symbols. Calculate  i) Self information of a dot and dash. ii) Average information content of a dot-dash code.	dots and presented ability of given in			200
dashes to transmit letters of English alphabet. The dash is replay a current pulse of duration 2ms and dot of 1ms. The probation is half as that of dot. Consider 1ms duration of gap is between the symbols. Calculate  i) Self information of a dot and dash. ii) Average information content of a dot-dash code. iii) Average rate of information.  OR  Derive Noiseless coding theorem and How codewords designed any symbols?	dots and presented ability of given in			
dashes to transmit letters of English alphabet. The dash is replaced by a current pulse of duration 2ms and dot of 1ms. The probabetween the symbols. Calculate  i) Self information of a dot and dash. ii) Average information content of a dot-dash code. iii) Average rate of information.  OR  Derive Noiseless coding theorem and Hammad.	dots and presented ability of given in d for	7	L2	COI
dashes to transmit letters of English alphabet. The dash is replay a current pulse of duration 2ms and dot of 1ms. The probable of the base of the base of duration 2ms and dot of 1ms. The probable of the symbols of the between the symbols. Calculate  i) Self information of a dot and dash. ii) Average information content of a dot-dash code. iii) Average rate of information.  OR  Derive Noiseless coding theorem and How codewords designed any symbols? Given the messages x <sub>1</sub> , x <sub>2</sub> , x <sub>3</sub> , x <sub>4</sub> x <sub>5</sub> with respective probabilition of the probability of the probabil	dots and presented ability of given in d for les {0.5, applying ney and	7 8 7	L2	CO2
dashes to transmit letters of English alphabet. The dash is replay a current pulse of duration 2ms and dot of 1ms. The probable of the base of the base of duration 2ms and dot of 1ms. The probable of the symbols of the between the symbols. Calculate  i) Self information of a dot and dash. ii) Average information content of a dot-dash code. iii) Average rate of information.  OR  Derive Noiseless coding theorem and How codewords designed any symbols? Given the messages x <sub>1</sub> , x <sub>2</sub> , x <sub>3</sub> , x <sub>4</sub> x <sub>5</sub> with respective probabilition of the probability of the probabil	dots and presented ability of given in d for les {0.5, applying ney and	7	L2	CO2
dashes to transmit letters of English alphabet. The dash is reploy a current pulse of duration 2ms and dot of 1ms. The probable of the symbols of dash is half as that of dot. Consider 1ms duration of gap is between the symbols. Calculate  i) Self information of a dot and dash. ii) Average information content of a dot-dash code. iii) Average rate of information.  OR  Derive Noiseless coding theorem and How codewords designed any symbols? Given the messages x <sub>1</sub> , x <sub>2</sub> , x <sub>3</sub> , x <sub>4</sub> x <sub>5</sub> with respective probabilitions, the messages x <sub>1</sub> , x <sub>2</sub> , x <sub>3</sub> , x <sub>4</sub> x <sub>5</sub> with respective probabilitions. Shannon-Fano encoding procedure. Determine the code efficient redundancy.  Apply Shannon encoding algorithm and generate binary codes set of symbols given in table below. Also find efficiency.  Sym A	dots and presented ability of given in d for les {0.5, applying ney and	7 8 7	L2 L3	CO2
dashes to transmit letters of English alphabet. The dash is reploy a current pulse of duration 2ms and dot of 1ms. The probable dash is half as that of dot. Consider 1ms duration of gap is between the symbols. Calculate  i) Self information of a dot and dash. ii) Average information content of a dot-dash code. iii) Average rate of information.  OR  Derive Noiseless coding theorem and How codewords designed any symbols? Given the messages x <sub>1</sub> , x <sub>2</sub> , x <sub>3</sub> , x <sub>4</sub> x <sub>5</sub> with respective probabiliti 0.25, 0.125, 0.0625, 0.0625) Construct a binary code by a Shannon-Fano encoding procedure. Determine the code efficient redundancy.  Apply Shannon encoding algorithm and generate binary codes set of symbols given in table below. Also find efficiency.	dots and presented ability of given in d for les {0.5, applying ney and	7 8 7	L2 L3	CO2

Note: Write internals in A4 sheets and in every page write your name, USN, subject name with your signture. After exam arrange all pages of answer script in single PDF file and Send the answer script to the mail id: nc.vcet@gmail.com

Prepared by: Naveena C

HOD 20/10/2020