

Practice Work Sheet 2



1. Define information theory (short question)
2. Draw and explain block diagram for information theory (long question)
3. Explain and draw communication model for digital communication (long question)
4. Define compression and its type. Also explain it with help of examples (short question)
5. What is a minimum compression that can be offered in a system A.
6. During test Atif decided to show his MCQs to Tayyab. Out of four choices A B C D , the probability that Atif has chooses option A in MCQ is 0.4. Probability for choosing option B is 0.3 and for c is 0.1 .
 - a. Calculate the entropy for the above MCQs option

7. Falaksher chats on face book every night. He always type one out of four pre-defined messages (e_1, e_2, e_3, e_4). The messages and their probability are as follow .

- a. $M_1 = \text{😊}$ $P(M_1) = 1/8$
- b. $M_2 = \text{Yes}$ $P(M_2) = 1/8$
- c. $M_3 = \text{bye}$ $P(M_3) = 1/4$
- d. $M_4 = \text{Sir Ahmad Is best}$

Calculate

- Probability of event 4
- Which event has maximum probability
- Find the entropy of source
- What is the rate of info generated by source in bits/sec. If falak send a message every microsecond

8. Sheikh Bilal has designed a tablet for his final year project . An image displayed on sheikh bilal tablet screen is displayed using 30,000 basic picture elements. More over each element can be adjusted as per one of the level of brightness out of 10

- a. Determine information per element
- b. Information Content of Picture /frame

9. Haris has committed with Rizwan that he will try to mark his proxy in communication class, if possible. If he succeeds in doing so he will send him a sms, else he will give him a mis call

- a. What information is received by Rizwan if if he recives a miss call
- b. Rizwan is 90% sure that he will be successful in getting his proxy marked . What information is received by Rizwan if he receives
 - i. Miss call
 - ii. SMS

10. Zoonash deisgned a system that provides us with 4 discrete levels of output (a,b,c d). He represented the four output as

- a. 00
- b. 01
- c. 10
- d. 11

It was noted that out of 20 output option a was received 10 times whereas option b was received 5 times. Whereas the probability of c and d remained 0.125 each

What is the average length for the above system?

Looking at the above system , shabaz claimed , that he can provde a more efficient source code , using huff man technique. Verify if the statement is true

Q12. Prove that for a binary channel Entropy is highest when Probability is 0.5

Q13. Using the below table , find the efficiency of English language ,

Q14. Using the below table provide the efficiency for a system that generates following message consisting of two alpha bets .

AA, BC FD, XT, AU, CD, GH, IJ, SD, TY , ON, RT, BH, QW, OI, BB, OI

Probability of occurrence of letters in the English language

Letter	Probability	$-\log P_i$	Letter	Probability	$-\log P_i$
Space	0.187	2.46	M	0.02075	5.60
E	0.1073	3.22	U	0.02010	5.64
T	0.0856	3.84	G	0.01633	5.94
A	0.0668	3.90	Y	0.01623	5.95
O	0.0654	4.11	P	0.01620	6.32
N	0.0581	4.16	W	0.01179	6.42
R	0.0559	4.27	B	0.00752	7.06
I	0.0519	4.33	V	0.00344	8.20
S	0.0499	4.54	K	0.00136	9.54
H	0.04305	5.02	X	0.00108	9.85
D	0.03100	5.17	J	0.00099	9.98
L	0.02775	5.38	Q	0.00063	10.63
F	0.02395	5.45	Z		
C	0.02260				