PURBANCHAL UNIVERSITY
2020

M. Sc. in Information System Engineering /First Semester/*Final*

Time: 03:00 hrs. Full Marks: 60 /Pass Marks: 30

MIE113: Communication System Engineering *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer ALL questions. **5×12=60**

1(a) With the development of science and technology, the field of electronics and communications has gone digital. Why do you think that this change is inevitable? Is there any cost associated this change over from analog to digital systems? Answer this question based on the comparison of analog and digital communication systems. 5

(b) Draw a generalized model of digital communications system and explain its working. If you are instructed to add a number of other elements in the transmitter in the above diagram, what element(s) would you add? Explain why would you add those elements? 5+2=7

2(a) A broadcast radio transmitter rated at 12 KW operates at 90% power efficiency. If the modulation percentage is 60, how much of this is carrier power and how much is in sidebands in a DSB AM system? 6

(b) Define modulation? What are the types of modulation? Compare AM and FM. 1+2+3

3(a) A source with bandwidth 4000Hz is sampled at Nyquist rate. Assuming that the resulting sequence can be approximately modeled as a discrete memory less source with alphabet A={-2, -1, 0, 1, 2} and corresponding probabilities {1/2, 1/4, 1/8, 1/16, 1/16}.

i) Find the source entropy

ii) What is the average number of bits necessary to represent this alphabet?

Contd. ...

(iii) Derive the binary representation of the source symbols by using Huffman coding. 2+2+4

(b) How do you justify the need for error control coding? List different types of error control coding techniques. Illustrate with examples how error detection and correction can be achieved with the addition of redundancy. 4

4(a) What do you mean by communication system? Draw the block diagram of satellite communication system and explain it briefly. Discuss its importance for a country like Nepal. 2+4+2

(b) What is multiplexing? Explain about FDM in brief. 2+2

5(a) Carry out a power budget analysis for the following long haul optical fiber link and sate whether this system is good. 6

Link length= 185 km

Transmitter power =1 mW

Fiber attenuation coefficient α= 0.25 dB/km

Number of Splice = 46

Splice Loss = 0.1 dB/splice

Connector Loss = 0.2 dB/connector and two connectors in the link

Receiver sensitivity=-28dBm

System Margin=6dB

Dispersion Coefficient, D = 18 ps/nm-km

(b) Write short notes on any TWO: 2×3=6

(a) GSM

(b) ADPCM

(c) Terrestrial Microwave