Roll No: ----------

UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B. Tech Electrical Engineering.	**Semester – V**
Subject (Course): Electronic Communication	**Max. Marks : 100**
Course Code : ELEG 308	**Duration : 3 Hrs**
No. of page/s:	

Note: 1) Answer in brief and to the points.
*2) Answer **all** questions from part A and part C and any **05** from part B*

Part A [4×5=20]

1. Compare the **two** widely used **analog communication modulation techniques** and comment on the **better** of the two.

2. Compare the simplest **FSK** and **PSK** scheme based on the criteria of choosing the suitable digital modulation technique.

3. Describe the Delta Modulation system. On what ground **DM** is useful than **PCM**. Comment on its drawbacks also.

4. Draw **Manchester** and **AMI** line coding of **1100010001**. Where they have find use?

Part B [8×5 = 40]

5. Define **sampling** and its condition. Find the **sampling frequency** and **separation between two pulses** of signal **m(t) = 10 Cos ^{2}6280t**.

6. What is TDM? How do you calculate the **rate of T1 line**? A signal containing two frequencies of **10 kHz** and **5 kHz** is converted into **binary digits** using PCM with the help of a **quantiser** of **64 levels**. Determine the **rate** of **transmission** and **SNR**.

7. Draw the **spectrum** of **Binary Phase Shift Keying** and **Binary Frequency Shift Keying** and calculate their **bandwidth**. The **carrier frequency** is 100 MHz and the **bit rate** is 500kbps.

8. Deduce the formula for finding the **total power** of **DSB amplitude modulated** signal. When a broadcast AM transmitter is modulated by 25%, its power is 12 kW. What will be the **carrier power** alone? Find the **efficiency** also.

9. Design a typical **FM transmitter** using **Armstrong** method operating at 96 MHz. Consider the **carrier frequency** of being 100 kHz, and the **frequency deviation** of 75 kHz. Write the notation of frequency at each point.

10. Design a MODEM using **binary digital phase modulation technique**. The carrier frequency is 50 MHz and the bit rate is 50 kbps. Write the notation of frequency at each point.

Part C **[2×20 = 40]**

11. If an analog message signal is represented as: **$m(t) = \cos 5000\pi t + \cos 1500\pi t$**, then what will be the separation, **in time**, between two consecutive sampled pulse train. The signal is then quantized and converted into stream of **1** and **0**. If the number of quantization level is **increased** from 64 to 256 in PCM, then how much the **rate** of transmission and **SQR** will be changed?

12. Code the following set of message and probability using **Shannon-Fano Coding** and **Huffmann Coding**. Write down the observation.

[M]	=	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8
[P]	=	0.25	0.15	0.12	0.11	0.10	0.09	0.08	0.10

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Part A **[4×5=20]**

1. Make a comparison between the **two digital modulation techniques** based on the Binary shifting of **Frequency** and **Phase**. Also state their application based on the comparison.

2. Draw **both** types of **Bipolar** line coding for the bit sequence of **1000110001**. State their usefulness. .

3. Comment on the advantages and disadvantages of **Amplitude Modulation** and **Frequency Modulation**. State their application also.

4. Describe the DM system. What are its limitations? What are the advantages and disadvantages of **PCM** over **DM**? Give two precise points each.

Part B **[8×5 = 40]**

5. Define **Nyquist** criteria of **sampling**. Calculate the sampling frequency and qunatisation level of signal **m(t) = 16 Cos ^{2}31400t**. The **step** size is 2 volt.

6. Define TDM and calculate the **rate** of **E1 line**. A signal is represented as **v(t) = A Cos 2π×12000t + B Sin 2π× 15000t**. The signal is **digitized** using PCM. The no of levels in the quantiser is 128. Determine the **rate** of transmission and **SNR**.

7. Draw the **spectrum** of **Binary Phase Shift Keying and Binary Frequency Shift Keying** and calculate their **bandwidth**. The **carrier frequency** is 10 MHz and the **bit rate** is 50kbps.

8. Deduce the formula for finding the **efficiency** of a **full carrier double side band amplitude modulated** signal. When a broadcast AM transmitter is modulated by 50% with career power of 6 kW, find its **efficiency** and **total** transmitted power.

9. Design a typical **FM transmitter** using **Armstrong** method operating at 96 MHz. Consider the **carrier frequency** of being 100 kHz, and the **frequency deviation** of 75 kHz. Write the notation of frequency at each point.

10. Design a MODEM using **Quaternary phase modulation** technique. **Compare** it with the MODEM design using binary phase shift keying.

Part C **[2×20 = 40]**

11. If an analog message signal is represented as: **$m(t) = \cos 5000\pi t + \cos 1500\pi t$**, then what will be the separation, **in time**, between two consecutive sampled pulse train. The signal is then quantized and converted into stream of 1 and 0. If the number of quantization level is **decreased** from to 256 to 128 in PCM, then how much the **rate** of transmission and **SQR** will be changed?

12. Code the following set of message and probability using **Shannon-Fano Coding and Huffmann Coding**. Write down the observation.

[M]	=	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8
[P]	=	0.15	0.25	0.06	0.11	0.10	0.09	0.14	0.10

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