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**Presidency University**

**Bengaluru**

 **SCHOOL OF ENGINEERING**

**MAKEUP EXAMINATION JULY 2024**

**Course Code**: ECE 3005

**Course Name**: ANALOG COMMUNICATION

**Program** : B.Tech

**Date**: 19-07- 2024

**Time**: 1:30pm to 4:30pm

**Max Marks**:100

**Weightage**:50%

 **Instructions:**

1. *Read the all questions carefully and answer accordingly.*
2. *Scientific calculators are allowed; programmable calculators are not allowed.*

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries 2marks. (10Qx 4M= 40M)**

1. Define modulation. Classify different types of modulation. (C.O.No.1) [Knowledge Level]
2. Explain the principle of coherent detection of SSB-SC modulated wave with a neat block diagram. (C.O.No.1) [Knowledge Level]
3. What are the differences between NBFM &WBFM? (C.O.No.2) [Knowledge Level]
4. Differentiate pre-emphasis from de-emphasis. (C.O.No.2) [Knowledge Level]
5. Differentiate between TDM & FDM. (C.O.No.4) [Knowledge Level]
6. List four comparison between AM and FM. (C.O.No.2) [Knowledge Level]
7. Scientist E.H.Armstrong was the pioneer in suggesting an indirect method for generating FM wave. Draw neat diagram of indirect method FM generator. (C.O.No.2) [Knowledge Level]
8. The specified voice spectrum is 300Hz-3.4 kHz. The sampling frequency used is 8 kHz. In practice, the frequency spectrum of human voice extends much beyond the highest frequency necessary for communication. Let the input analog information signal contains 5 kHz frequency component also. What would happen at the output of the sampler? How can this problem be prevented? (C.O.No.3) [Knowledge Level]
9. What are the advantages and disadvantages of PPM? (C.O.No.3) [Knowledge Level]
10. Sampling theorem provides the link between analog world and digital world. Consider a continuous time signal s(t)=$10cos\left(20πt\right)\cos(\left(200πt\right))$ Determine
11. The maximum frequency component present in the input signal.
12. Nyquist rate
13. Specify the condition for aliasing. (C.O.No.2) [Knowledge Level]

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each question carries 10 marks. (2Qx15M=30M)**

1. As part of the assignment, while performing experiments John observed that in spectrum analyzer, the standard AM signal spectrum and NBFM signal spectrum are similar except for polarity of LSB.
2. Is the observation true?
3. Help him to prove his observation theoretically by deriving the NBFM signal in time as well in frequency domain and comparing it with standard AM signal. Also comment on the Bandwidth. (C.O.NO 2) [Comprehension Level]
4. Pulse modulation is a type of modulation in which the signal is transmitted in the form of pulses. It can be used to transmit analog information. In pulse modulation, continuous signals are sampled at regular intervals. Students have the liberty to take analog message signal of their choice.
5. Classify the different types of Pulse modulation techniques
6. Identify the form of signal modulation where the message information is encoded in the amplitude of a series of signal pulses.
7. Explain the above modulation with the help neat diagrams.
8. Can the message information is present in width and positioning of the pulses instead of amplitude? Explain with the help of neat diagrams
9. List any 2 advantages and disadvantages of the above mentioned pulse modulation scheme.

 (C.O.NO 3) [Comprehension Level]

**Part C [Problem Solving Questions]**

**Answer all the Questions. Each question carries 10 marks. (3Qx10M=30M)**

1. A message signal m(t) with spectrum shown in the below figure is applied to a product modulator with a carrier wave Ac cos(2πfct) producing the DSB-SC modulated wave S(t). This modulated wave is then applied to a coherent detector. Assuming a perfect coherence between the transmitter and receiver, determine the spectrum of the detector output when



1. fc=1.25khz.
2. fc=0.75khz and sketch the same
3. The lowest fc so the m(t) is uniquely determined from S(t).

(C.O.NO 1) [Application Level]

1. An angle modulated FM wave is given by the equation S(t)=10cos[5.7\*108t+5sin(12\*103t)]. Determine
2. Carrier frequency
3. Modulating frequency
4. Modulation index
5. Frequency deviation
6. Power dissipated in a 100Ω load resistor. (C.O.NO 2) [Application Level]
7. A RED FM station in Bangalore uses 93.2MHz carrier; which is frequency modulated by an audio signal of 5 kHz sine wave. The resultant FM signal has frequency deviation of 40 kHz.
8. Find the carrier swing of the FM signal.
9. What are the highest and lowest frequencies attained by the frequency modulated signal?
10. Calculate the modulation index for the wave.
11. Calculate Bandwidth. (C.O.NO 2) [Application Level]