PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

MAKEUP EXAMINATION – JAN 2023

Course Code: ECE 1005

Course Name: Journey of Communication Systems.

Program : B. Tech

Date: 23-JAN-2023

Time: 09:30 AM – 12:30 PM

Max Marks: 100

Weightage: 50%

Instructions:
Read all questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.   (10Qx 2M= 20M)

1. Modulation is a process of changing the characteristics of the wave to be transmitted by superimposing the message signal on the high-frequency signal_____signal holds the data that has to be transmitted.
(C.O.No. 3) [Comprehension]

2. Electromagnetic spectrum is the range of all types of EM radiation. Mention the types of EM radiation that make up the electromagnetic spectrum.   (C.O.No. 3) [Knowledge]

3. Communication channel refers to a transmission medium to transport data from one or several senders(or transmitters) to one or several receivers. What are the two types of hannels.(C.O.No.3)[Comprehension]

4. The digitized signals allow the communication to be more clear,_____is the process of measuring the instantaneous values of continuous-time signal in a discrete form   (C.O.No. 2) [Comprehension]

5. The process in which multiple signals coming from multiple sources are combined and transmitted over a single communication/physical line_____ is used in cases where the signals of lower bandwidth and the transmitting media is having higher bandwidth   (C.O.No.4) [Knowledge]

6. In _____the time slots are pre-assigned and fixed. This slot is even given if the source is not ready with data at this time. In this case, the slot is transmitted empty.   (C.O.No.4) [Knowledge]

7. A TV signal contains both voice and picture and is usually allocated _____of bandwidth for transmission   (C.O.No.2) [Comprehension]

8. For the effective transmission of a signal, the height h of the antenna should be comparable to the wavelength λ of the signal at least the height of the antenna h should be_____   (C.O.No.3) [Knowledge]

9. A TV signal contains both voice and picture and is usually allocated _____of bandwidth for transmission.   (C.O.No.3) [Application]

Q10. Nyquist rate defines 'fs' sampling frequency to be related to_____   (C.O.No.3) [Application]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries EIGHT marks. **(5Qx8M=40M)**

11**.** Voice communications have traditionally been a very simple medium to intercept and monitor. Most voice communication systems are not designed to ensure the privacy of the conversations on them, so a new industry was created to provide solution. Design a suitable communication system which can facilitate the mention needs. (C.O.No.3) [Application]

12. Modulation depth also referred as modulation index gives the quality and strength of the transmitted signal. If the modulation index is small, the extent of variation in the carrier amplitude will be small. Accordingly the audio signal being transmitted will not be strong.Greater the depth of modulation , clearer and stronger will be the audio signal. Draw and give the condition for perfect,under and over modulation process.
(C.O.No.3) [Application]

13. The receiver operates by taking the signal on the incoming frequency, mixing it with a variable frequency locally generated signal to convert it down to a frequency called as intermediate frequency, where it can pass through a high performance fixed frequency filter before being demodulated to extract the required modulation or signal. Design the receiver circuit for the process involved
(C.O.No.2) [Comprehension]

14. Bluetooth is a short-range wireless technology standard that is used for exchanging data between fixed and mobile devices over short distances using UHF radio waves in the ISM bands, from 2.402 to 2.48 GHz. It is mainly used as an alternative to wire connections, to exchange files between nearby portable devices and connect cell phones and music players with wireless headphones. Which type of a network is designed for sending and receiving files between cell phone and Laptop using Bluetooth technology.
(C.O.No.3) [Application]

15.In a television serial, generally, a 10 minutes' serial is followed by a 5 minutes' advertisement. The time in which the serial is being broadcasted, the total frequency is dedicated to the serial. Incoming signals are divided into equal fixed-length time slots. After multiplexing, these signals are transmitted over a shared medium and reassembled into their original format after de-multiplexing. Design a suitable multiplexing technique. (C.O.No.4) [Application]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TWENTY marks. **(2Qx20M=20M)**

16. a) An antenna is a system of elevated conductors which couples the transmitter or the receiver to the communication channel. Thus it required at both the ends. For proper transfer of signal (modulation) the height of the antenna should be comparable to the wavelength of the signal which is to be transferred (at least one-fourth in length).

i.Find the wavelength of antenna required to transmit a radio signal of frequency 40MHz

ii.What is the minimum height of the antenna required.

iii.Find the Bandwidth of FM radio. Given frequency band 88MHz to 108MHz

b)   A modulating signal $10\sin(2\pi x 10^3 t)$ is used to modulate the carrier signal $20\sin(2\pi x 10^3 t)$. Determine the frequency of the carrier signal and message signal, modulation index and also the type of modulation. [10M+10M] (C.O.No.3) [Comprehension]

17. An antenna is a system of elevated conductors which couples the transmitter or the receiver to the communication channel. Thus it required at both the ends. For proper transfer of signal (modulation) the height of the antenna should be comparable to the wavelength of the signal which is to be transferred (at least one-fourth in length).

a) Find the wavelength of antenna required to transmit a radio signal of frequency 20MHz

b) What is the minimum height the antenna required.

c) Find the Bandwidth of FM radio.Given frequency band 88MHz to 108MHz

[5M+10M+5M] (C.O.No.2) [Knowledge]