

U.G. 6th Semester Examination - 2020**PHYSICS****Course Code : BPHSDSHC5****Course Title : Communication Electronics**

Full Marks : 30

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*1. Answer any **ten** questions: $1 \times 10 = 10$

- Give the full form of TRAI. According to TRAI, what is the allocated frequency range of AM radio broadcasting in India?
- What do you mean by an envelop? Write down the expression for it.
- The instantaneous voltage of an AM wave is given by

$$V_{AM}(t) = 10(1 + 0.5 \cos 2\pi \times 10^3 t) \cos 2\pi \times 10^6 t \text{ volts.}$$

Find out the amplitude and frequency of two side bands.

- Give the full form of DSBTCAM and SSBSCAM.
- State Carson's rule in context of frequency modulation.
- Define PAM and mention its advantages over PTM.
- With help of block diagram achieve a phase modulator circuit from a frequency modulator.
- The peak to peak value of an AM voltage has a maximum value of 8 V and a minimum value of 2 V. What is the percentage modulation?
- Sketch the waveform to explain pulse width modulation (PWM).
- Show that an increase in the number of bits in the code word by 1 enhances the output SNR by 6 dB in PCM.
- Why is the downlink frequency is less than the uplink frequency?
- The co-ordinates for an earth station are 43° south, 30° east. Calculate the limits of visibility.

$$[\text{Given } R_{\text{earth}} = 6378 \text{ km, } r_{\text{gso}} = 42,164 \text{ km}]$$

[Turn Over]

- m) Mention two advantages of satellite communication.
- n) What is mean by cell splitting?
- o) What is SIM?

2. Answer any **five** questions: 2×5=10

- a) Why modulation of signal is necessary in electronic communication system?
- b) Define signal to noise ratio. What is its significance?
- c) Stating the advantages and disadvantages compare AM with FM.
- d) An FM transmitter sends out a 100 MHz carrier wave frequency modulated by a 15 kHz sinusoidal audio signal. The maximum frequency deviation is 30 kHz. Find
 - i) the modulation index
 - ii) the three significant pairs of side frequencies.
- e) Define channel capacity. How the maximum data rate of a channel depends upon its bandwidth (B) and signal to noise ratio (S/N) according to Shannon's theorem?

- f) Define pulse modulation and name the different type of pulse modulation.
- g) What do you mean by geo-stationary orbit? Why there is only one such orbit?
- h) Distinguish between 3G and 4G cellular networks.

3. Answer any **two** questions: 5×2=10

- a) Explain how an FM waveform can be generated using a VCO. Give the circuit diagram with proper labelling. 3+2
- b) From sampling theorem, find the Nyquist rate and Nyquist interval for the signal

$$v_m(t) = 4 \cos(4000\pi t) \cos(2000\pi t).$$

With proper block diagram explain the principle of time division multiplexing.

2+3

- c) What are the basic needs for digital communication? With proper block diagram explain the concept of Amplitude shift keying (ASK). 2+3
