



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 6th Semester Examination, 2023

PHSADSE06T-PHYSICS (DSE3/4)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Question No. 1 is compulsory and answer any two from the rest

1. Answer any *ten* questions from the following: 2×10 = 20
- Draw the basic block diagram of an electronic communication system.
 - If a signal has power 10 mW and the signal is directly competing with noise level power 0.1 mW. Find the signal to noise ratio. Comment on the quality of the signal from the ratio.
 - A sinusoidal modulating waveform of amplitude 5 V and frequency of 2 kHz is applied to FM generator, having frequency sensitivity of 40 Hz/volt. Calculate the frequency deviation, and modulation index.
 - In practical purposes, pulse width modulation (PWM) is used instead of pulse amplitude modulation. Explain why.
 - Why do we need higher frequency carrier wave for frequency modulation than amplitude modulation?
 - Calculate the percentage power saving when the carrier and one of the sidebands are suppressed in an AM wave modulation to a depth of 50%.
 - Why downlink frequencies are lower than uplink frequencies in satellite communication, whereas downlink frequencies are higher than uplink frequencies in other communications?
 - Mention the differences between frequency division multiplexing (FDM) and time division multiplexing (TDM).
 - Describe the differences between 2G, 3G and 4G mobile telecommunication technologies.
 - What is Carson's rule relating bandwidth of FM wave?
 - Mention three useful uses of Geosynchronous Satellite.
 - Explain the difference between ASK and FSK modulation techniques.
 - What is the need for data encryption in mobile telephony system?
 - In PCM, if the number of quantization level is increased from 4 to 64, then what will be the change in bandwidth requirement?

2. (a) Show that the amount of frequency deviation is independent of modulation signal frequency in the case of frequency modulation. 2
- (b) Draw the block diagram of SSBSC (Single side band suppressed carrier) modulation system. Explain its working. 2+2
- (c) Sketch the circuit diagram of an AM demodulator envelope detector. Explain under what conditions it works? What do you mean by diagonal clipping and negative peak clipping? 1+1+2
3. (a) Draw the circuit diagram / basic block diagram of a PAM system. Explain the principle of operation. 3
- (b) Draw the basic block diagram of Superheterodyne receiver and explain each part. 2+2
- (c) Why binary phase shift keying (BPSK) is most robust of all the PSKs? 3
4. (a) What is meant by sampling of a signal? Mention the types of sampling. 2+2
- (b) State and prove the sampling theorem. 1+3
- (c) State the differences between PWM and PPM. 2
5. (a) Draw the block diagram of PCM system. What is quantizer in PCM system? 3+1
- (b) What are the advantages of TDMA Technology? 2
- (c) What is the difference between GSM and CDMA? 2
- (d) Why every mobile has unique IMEI number? 2