U.G. 6th Semester Examination - 2022

PHYSICS

Course Code : BPHSDSHC5 [DSE-5]

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: 1×10=10

a) Define figure of merit in connection with noise of electronic communication system.

b) If an audio information covers 0-5 kHz range and the carrier frequency is 100 kHz calculate the range of upper and lower sideband frequencies.

c) Compare SSBSCAM with DSBSCAM in terms of power and bandwidth usage.

d) Why FM is superior to AM in radio reception?

e) Find the expression of a phase modulated signal when the carrier wave $V_c \cos(\omega_c t)$ is phase modulated by the message signal $V_m \cos(\omega_m t)$.

f) What is frequency reuse?

g) What is co-channel interference?

h) State and explain sampling theorem.

i) What are the basic units of a cellular system?

j) Define handoff in mobile communication system.

k) What is IMEI number? What are its uses?

l) What is time division multiplexing (TDM)?

m) Why is PSK always preferable over ASK in coherent detection?

n) Why is encryption needed in data communication?

o) What is SIM?

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

a) An AM transmitter develops an unmodulated power output of 100 watts across a 10 Ω load. The carrier is modulated by a sinusoidal signal with a modulation index of 0.5. Assuming $f_m = 5$ kHz and $f_c = 2$ MHz:

i) Write the equation of AM.

ii) Find the total power of the modulated output.

b) With help of block diagrams obtain a phase modulator circuit from a frequency modulator. Explain with expression.

c) Define all three different techniques of PWM.

d) State Carson's rule in context of frequency modulation.

e) Why frequency allocation is essential in communication system?

f) What are the advantages of navigation system based on satellite?

g) Mention two advantages of digital communication over analog communication.

h) Compare LEO, GEO and MEO satellite.

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

a) Draw a neat block diagram of a PCM (Pulse code modulation) transmitter. Explain the function of each block with its output waveform. 1+4

b) Give the full form of SSBAM. Discuss with block diagram how we can generate or detect an SSBAM signal. 1+4

c) Discuss the Kepler's laws in connection with satellite communications. A satellite is orbiting in a geosynchronous orbit of radius 42500 km. Find the velocity and time of orbit. What will be the change in velocity if the radius reduces to 36000 km [Kepler's constant=398600.5 Km^3s^2]? 2+3

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