

U.G. 6th Semester Examination-2025**PHYSICS****[HONOURS]****Discipline Specific Elective (DSE)****Course Code : PHY-H-DSE-T-03****(Communication Electronics)****[New Syllabus]**

Full Marks : 60

Time : $2\frac{1}{2}$ 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.***GROUP-A**

1. Answer any five questions: $2 \times 5 = 10$
- a) Give an idea of frequency allocation for radio communication system in India (TRAI).
 - b) What is phase modulation?
 - c) What are the differences between GSM and CDMA technologies?
 - d) What is IMEI number? Mention its significance?
 - e) What are the differences between 2G, 3G, 4G network?

[Turn Over]

- f) Write two advantages of GPS navigation system.
- g) What are the advantages of PSK over FSK?
- h) What do you mean by time division multiplexing?

GROUP-B

2. Answer any four questions: $5 \times 4 = 20$
 - a) Draw the basic block diagram of Superheterodyne receiver and explain the function of each block. 5
 - b) Write two advantages of digital transmission. Draw a block diagram showing the basic elements of a PCM system. $2+3$
 - c) Write short note on geostationary satellite and its advantages. 5
 - d) Give basic ideas about GSM, CDMA, TDMA and FDMA technologies. 5
 - e) Draw the block diagram and explain how PAM signals are generated. $2+3$
 - f) What are the cell sectoring and cell splitting in mobile communication? $2\frac{1}{2}+2\frac{1}{2}$
 - g) A 80 MHz carrier is frequency modulated, the modulation index being 4. The frequency of the information signal is 10 KHz. What is the maximum frequency deviation? 5

GROUP-C

3. Answer any three questions: $10 \times 3 = 30$
 - a) What is amplitude modulation? Obtain an expression for an AM wave with sinusoidal modulation. Define modulation index. The peak to peak value of an AM voltage has a maximum value of 5V and a minimum value of 1 V. If the depth of modulation is 0.7, what is the amplitude of the unmodulated carrier voltage? $2+2+2+4$
 - b) What is pulse code modulation? Explain the terms sampling and quantizing in pulse code modulation. Derive an expression for SNR for linear quantization. What is the disadvantage of linear quantization? $2+3+3+2$
 - c) Give an idea about the various frequency bands used in mobile communication. Draw a simplified block diagram of mobile phone handset. What is SIM number? Mention its significance. What are the differences between TDMA and FDMA technologies? $2+3+2+3$
 - d) What is demodulation? Explain with proper circuit diagram how an AM wave can be detected, using a diode detector. How can a slope detector be employed to detect frequency modulated waves, explain with circuit diagram? $2+4+4$

- e) Write the basic principles of PAM, PWM, PPM modulation. Draw a simple block diagram of digital communication system. Explain the function of each block. What are the different techniques involved in digital Carrier Modulation? Explain each technique briefly.

3+4+3