

**Duration: 3hrs**

**[Max Marks:80]**

- N.B. : (1) Question No 1 is Compulsory.  
(2) Attempt any three questions out of the remaining five.  
(3) All questions carry equal marks.  
(4) Assume suitable data, if required and state it clearly.

- 1** Attempt any FOUR **[20]**
- a Discuss the need for modulation.
  - b The antenna current of an AM transmitter is 8A when only the carrier is sent, but it increases to 8.93A when the carrier is modulated by a single sine wave. Find the percentage modulation. Determine the antenna current when the depth of modulation changes to 0.8.
  - c Compare narrowband and wideband FM.
  - d Define the following terms: sensitivity, selectivity, fidelity and image frequency rejection ratio w.r.t. the receivers.
  - e Compare delta modulation and adaptive delta modulation.
- 2** a State sampling theorem. Discuss natural sampling and flat-top sampling with neat diagrams. **[10]**
- b Compare FM and PM. **[05]**  
Find the carrier and the modulating frequencies, the modulation index, and the maximum deviation of the FM represented by the voltage equation  $v=20\sin(8\times 10^8t+10\cos 2500t)$ . What power will this FM wave dissipate in a  $10\Omega$  resistor? **[05]**
- 3** a Discuss various sources of noise. **[10]**
- b Explain phase shift method of SSB generation with equations. **[05]**  
Calculate the power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of 50%. **[05]**
- 4** a Draw the block diagram of Armstrong method of frequency generation and explain how FM is obtained from it. **[10]**
- b Explain in detail Pre-emphasis and de-emphasis. **[10]**
- 5** a What is AGC? Discuss the types of AGC. **[10]**
- b Explain superheterodyne receiver with a proper block diagram. **[10]**
- 6** a Explain generation of PAM, PWM, and PPM signals. **[10]**
- b With a neat block diagram explain FDM in detail. **[10]**
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