

**Code: DE12**  
**Time: 3 Hours**

**Subject: COMMUNICATION ENGINEERING**  
**Max. Marks: 100**

<b>DECEMBER 2007</b>
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**NOTE: There are 9 Questions in all.**

- **Question 1 is compulsory and carries 20 marks. Answer to Q. 1. must be written in the space provided for it in the answer book supplied and nowhere else.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

**Q.1 Choose the correct or best alternative in the following: (2x10)**

- a. The most commonly used filters in SSB generation are
 

(A) Mechanical.	(B) RC.
(C) Low pass.	(D) LC.
  
- b. The power handling capacity of a transmission line depends on
 

(A) the type of dielectric material used.
(B) distance between the conductors.
(C) Both of the above.
(D) None of the above.
  
- c. The core of the basic single fiber cable consists of
 

(A) Silica.	(B) Acrylic.
(C) Quartz.	(D) None of the above.
  
- d. Multiplexing means sending of separate signals together
 

(A) simultaneously.	(B) without interference.
(C) Both of the above.	(D) None of the above.
  
- e. The event which marked the start of modern computer age was
 

(A) design of ENIAC computer.
(B) development of Hollerith code.
(C) development of transistor.
(D) development of storage disk drives.
  
- f. Wave guide ends & flanges must be smoothly finished to
 

(A) compensate for discontinuities at joints.
(B) increase bandwidth of the system.
(C) help alignment of wave guides.
(D) decrease bandwidth of the system.
  
- g. In electromagnetic waves, polarization
 

(A) is caused by reflection.
(B) is due to transverse nature of the waves.
(C) results from longitudinal nature of the waves.
(D) is always vertical in an isotropic medium.
  
- h. Diffraction of electromagnetic waves
 

(A) is caused by reflections from the ground.
(B) arises only with spherical wavefronts.
(C) will occur when the waves pass through a large slot.
(D) may occur around the edge of a sharp obstacle.
  
- i. The difference between Phase & Frequency modulation
 

(A) is purely theoretical because they are same in practice.
(B) is too big to make the two systems compatible.

- (C) lies in the poorer audio response of phase modulation.  
 (D) lies in different definitions of modulation index.
- j. Space noise generally covers a wide frequency spectrum, but the strongest interference occurs
- (A) between 8 MHz and 1.43 MHz.  
 (B) below 20 MHz.  
 (C) between 20 and 120 MHz.  
 (D) above 1.5 GHz.

**Answer any FIVE Questions out of EIGHT Questions.  
 Each question carries 16 marks.**

- Q.2** a. Giving the block diagram of a communication system. Explain what do you understand by the term Information. (6)
- b. What is a "Binary System". Explain the system by using the example of lights and switches. (4)
- c. Define the following terms  
 (i) Signal to noise ratio  
 (ii) Noise figure (2x3)
- Q.3** a. What do you understand by 'The Elementary Doublet'. Draw the sketch of the top view of the radiation pattern of an elementary doublet. (6)
- b. With the help of relevant diagrams, explain the working of Loop Antennas. (6)
- c. Determine the length of an antenna operating at a frequency of 500kHz. (4)
- Q.4** a. Using a Block Diagram, explain the working of a Superhet Receiver. (8)
- b. How will you choose Intermediate Frequencies of receivers. What are the standardized IFs, used throughout the world. (8)
- Q.5** a. What is Characteristic Impedance of a circuit? Give the mathematical equation of the characteristic impedance of an iterative circuit consisting of series and shunt elements. (8)
- b. Modify the above equation for radio frequencies. (2)
- c. A co-axial cable, having an inner diameter of 0.025mm and using an insulator with a dielectric constant of 2.56, is to have a characteristic impedance of 2000 ohms. What must be the diameter of the outer conductor? (6)
- Q.6** a. Explain the basic principle of differential PCM with the help of transmission and reception diagrams. (8)
- b. What is companding in PCM? (4)
- c. Give the advantages and applications of PCM (4)
- Q.7** Write notes on any TWO of the following:  
 (i) Rectangular Wave guides,  
 (ii) Tropospheric Scatter Communication  
 (iii) Phase-locked loop Demodulator (8x2)
- Q.8** a. With the help of a block diagram, explain the phase discriminator used as FM demodulator. (8)

- b. A 25 MHz carrier is modulated by a 400-Hz audio sine wave. If the carrier voltage is 4 V and the maximum deviation is 10 kHz, write the equation of this modulated wave for (i) FM and (ii) PM. If the modulating frequency is now changed to 2 kHz, all else remaining constant, write the new equation for (iii) FM and (iv) PM  
(8)

**Q.9** a. Explain Group and Phase velocities in a wave guide. (8)

- b. Calculate the ratio of cross-sections of a circular wave guide to that of a rectangular one, if each is to have the same cut-off wavelength for its dominant mode. (8)