**St Joseph’s College (Autonomous), Bangalore-27**

**VI Semester B.Sc. Electronics**

**Communication Electronics EL-6115**

**Semester Examination**

Time: 2½ hrs Max.Marks:70

This paper contains **three** printed pages and **three** parts

**Part A**

Answer any five questions 8X5=40

1. a) Broadly classify various ranges of electromagnetic spectrum in terms of frequency and mention field of application of each range.

b) Derive an expression for frequency modulated wave. 4+4

1. a) Explain the four predominant methods of pulse modulation with relevant waveforms.

b) What is distortion in data transmission circuits. Explain with necessary circuit how to reduce distortions. 4+4

1. a) Differentiate between resonant and non-resonant antennas.

b) Derive an expression for total power radiated by an antenna. 2+6

1. a) With the necessary block diagram explain the working principle of CW Doppler RADAR.

b) With a neat diagram explain different types of satellite orbits. 5+3

1. a) What is multiple access system? Discuss TDMA, FDMA and CDMA.

b) With the help of a block diagram explain fiber optic communication systems. 5+3

1. a) What are the requirements of light sources? Briefly explain the construction and working of unguided LASER diode.

b) Give four losses of optical fiber cables. 6+2

1. a) Explain mobile communication with the help of a block diagram

b) Explain serial and parallel data transmission 4+4

**Part B**

Answer any five questions 4X5=20

1. A sinusoidal carrier has a peak value of 100V and a frequency of 100kHz. The modulating signal being a sine wave of amplitude 75V and frequency 5kHz. Determine (a) the modulation index (b) the amplitude and frequencies of the side frequencies and (c) the power in each spectral component. The load resistance is 300Ω.
2. The frequency modulated voltage across a 100Ω load resistor is represented by the equation νFM =10sin(2∏X108+4sin3140t). Find the carrier frequency, modulating frequency, modulation index, maximum frequency deviation and power.
3. A system has bandwidth of 6kHz and a signal to noise ratio is 20dB at the input to the receiver. Calculate (a) its information capacity and (b) the capacity of the channel if its bandwidth is doubled while the transmitted signal power remains constant.
4. A short vertical grounded antenna is designed to radiate at 800kHz. Calculate its radiation resistance taking effective height as 27 meters.
5. A RADAR antenna has a power gain of 60 and a captive area of 5m2. If it transmits 120kW, what is the power density at the target at a distance 5km from the antenna. If the effective area of the target is 20m2, what is the power received by the antenna from the target.
6. In a satellite communication system, free-space conditions may be assumed. The satellite is at a height of 36,000km above earth, the frequency used is 4000MHz, the transmitting antenna gain is 15dB, and the receiving antenna gain is 45dB. Calculate (a) the free-space transmission loss and (b) the received power when the transmitted power is 200W.
7. An optic fiber is made of glass with a refractive index of 1.55 and is clad with another glass with a refractive index of 1.51. Launching takes place from air. (a) What numerical aperture does the fiber have? (b) What is the acceptance angle?

**Part C**

Answer any five questions 2X5=10

1. What is the frequency and energy range of waves used for optic fiber communication?
2. Which medium is used for AM and FM radio communication?
3. What is De-emphasis circuit? How is it achieved?
4. With necessary waveforms draw ASK and FSK modulated waves.
5. What is a nautical mile? How it is related with Km?
6. What is the difference between SPS and PPS?
7. Give two protocols and standards used for data transmission.