Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

(A Constituent Institute of MAHE – Deemed University)

Manipal – 576 104

FIFTH SEMESTER B.E. DEGREE MAKE-UP EXAMINATIONS – JANUARY. 2007

SUBJECT: BIOTELEMETRY SYSTEMS (BME 309)

(REVISED CREDIT SYSTEM)

Friday, January 12, 2007: 2.00 p.m.-5.00 pm.

TIME: 3 HOURS   **MAX. MARKS: 100**

Instruction to Candidates:

Answer any FIVE full questions.

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1. (a) An audio frequency signal $10\sin(2\pi * 500t)$ is used to amplitude modulate a carrier of $50\sin(2\pi * 10^5 t)$. Calculate   10

   (1) Modulation index
   (2) Side band frequencies
   (3) Amplitude of each side band frequencies
   (4) Bandwidth required
   (5) Total power delivered to the load of 600Ω

   (b) Explain how square law detector is used to detect the following signal   10
   $$x(t) = (1 + m\cos w_m t)\cos w_c t$$

2. (a) Find the carrier & modulating frequencies, the modulation index, and the maximum deviation of the FM wave represented by the voltage equation,   10
   $$V = 12\cos(6 * 10^8 t + 5\sin(1250t)).$$ What Power will this FM wave dissipate in a 10Ω resistor?

   (b) Show that the bandwidth of an FM wave is given by the equation, $B=2(\beta+1)f_m$ where β is the modulation index and f_m is the frequency of the modulating signal.   10

3. (a) Explain the working of DPSK transmitter and DPSK receiver.   10
   (b) Explain in detail the different blocks in the PCM transmitter, transmission path & the PCM receiver.   10

4. (a) Show that the square law detector is at a disadvantage for below threshold condition.   12
   (b) Prove that the figure of merit of the synchronous demodulator for the DSB-FC is always less than 1.   08

5. (a) Derive the equation for the output signal to noise ratio of a FM detector for the condition signal power>>noise power.   14
   (b) Compare the performance of the FM & AM demodulators in the presence of white noise.   06

6. (a) Explain in detail about the implanted transmitters & materials used in Biotelemetry.   10
   (b) Explain how telemetry is used in the care of critically ill patients.   10