Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

V SEMESTER B.TECH. (PRINT AND MEDIA TECHNOLOGY)

END SEMESTER MAKE-UP EXAMINATIONS, DEC/JAN 2016-17

SUBJECT: COMMUNICATION SYSTEMS [PME 4006]
PROGRAM ELECTIVE II

REVISED CREDIT SYSTEM
(07/01/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. A message signal $m(t) = 3\cos(2\pi 100t)$ is used to amplitude modulate a carrier $c(t) = 20\cos(2\pi 10000t)$. Assuming modulation index of 70%, find the following.

a) Carrier current and total current delivered to a 100Ω load.

b) Sideband frequencies.

c) Amplitude of each sidebands.

d) Total power delivered to a 300 Ω load.

1B. Explain the generation of AM signal using square law modulator.

1C. A message signal $m(t) = 4\cos(2\pi 100t) * 2\cos(2\pi 200t)$ is used to amplitude modulate a carrier $c(t) = 20\cos(2\pi 20000t)$. Calculate the corresponding upper and lower sideband frequencies.

[05 + 03 + 02]

2A. With a block diagram explain the working of an analog to digital converter. Also explain its role in the PCM coder.

2B. Explain the coherent detection of DSBSC signal with a neat diagram.

2C. Determine the minimum sampling frequency required to sample a signal $m(t) = 2\cos(2\pi 400t) * 2\cos(2\pi 300t) * \cos(2\pi 500t)$

[05 + 03 + 02]

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3A. Explain the role of various subsystems used in a satellite communication system.

3B. A satellite is radiating a power of 4 W with an antenna gain of 18dB in the direction of an observer. The receiving antenna at a distance of 39000km has a gain of 32.3dB. If the transmitting frequency is 11GHz, find the received power.

3C. What is sun transit outage for a communication satellite?

[05 + 03 + 02]

4A. With a block diagram, explain the architecture of global system for mobile communication.

4B. Calculate the radius of first and third Fresnel zones, given distance of obstacle from transmitter as 4km and from receiver as 3km measured along LOS path with 3GHz frequency of transmission.

4C. Calculate the free space path loss in dB for a 20km LOS link operating at 2.6GHz.

[05 + 03 + 02]

5A. Derive an expression for the maximum acceptance angle and numerical aperture of a normal step index fiber.

5B. Calculate the core radius necessary for the single mode operation of a step index fiber operating at 1320nm wavelength. Given core and cladding refractive indices as 1.48 and 1.478 respectively. Also determine the numerical aperture and maximum acceptance angle for this fiber. Repeat the calculations if wavelength is changed to 1550nm.

[05 + 05]