Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

SEVENTH SEMESTER B.Tech. (E & C) DEGREE END SEMESTER EXAMINATION
NOV 2017
SUBJECT: COMMUNICATION SYSTEMS (ECE -401)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates

- Answer **ANY FIVE** questions.
- Missing data may be suitably assumed.

1A. With a neat block diagram, explain pulse radar

1B. With relevant mathematical expressions, explain butterfly effect in MTI radar

1C. With a transmit frequency of 5GHz, calculate the Doppler frequency seen by a stationary radar when the target radial velocity is 200km/hr

(5+3+2)

2A. With neat diagrams, explain different subsystems of satellite communication

2B. Describe a) Eclipse b) Sun transit outage in geosynchronous satellite communication

2C. A satellite is at a distance of 40000km from a point on the earth's surface which radiates a power of 2W with an antenna having gain of 17dB in the direction of the observer. The receiving antenna has a gain of 52.3dB. The transmitting frequency is 11GHz. Find the received power

(5+3+2)

3A. With neat diagrams, explain the basic telephone system

3B. Find the core radius necessary for single mode operation at 1320nm of a step-index fiber with n_1=1.480 and n_2=1.478. What are the numerical aperture and maximum acceptance angle of this fiber?

3C. What are the drawbacks of conventional cordless telephones? How it is overcome in advanced cordless phones?

(5+3+2)

4A. With a neat block diagram, explain basic cellular system

4B. Derive the expression for pulse broadening due to material dispersion

4C. Calculate the necessary clearance path for first Fresnel zone. Given that distance of the obstacle from transmitter = 4km and from the receiver = 3km measured along LOS. The frequency of transmission is 3GHz

(5+3+2)

5A. Explain the principle and working of surface emitting LED and edge emitting LED

5B. Calculate maximum active tracking range of a deep space radar using peak pulse power of 0.5 MWatts with an antenna diameter of 64meters, noise figure 1.1. Beacon antenna diameter is 1 meter, noise figure 13 dB and transmits a peak pulse power of 50 Watts (Assume $T=17^{O}$ C and K=0.65)

Frequency of operations for both radars=2.5GHz

Bandwidth for both radars = 5kHz

Derive the equations used

5C. With a neat diagram, explain PIN photodiode

(5+3+2)

6A. With a neat diagram, explain the elements of an optical fiber transmission link. Also list the advantages of optical fiber over conventional copper cables

6B. With an example and graph, explain power budget in an optical fiber communication link

6C. Explain the bending losses in optical fiber communication

(5+3+2)