

Total number of printed pages – 7

B. Tech
PEEC 5412

Eighth Semester Examination – 2008

TELEMATICS

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

Due credit will be given to neatness in answering and drawing suitable figures.

1. Answer in short or point : 2 × 10
- (a) List the function of Time Slot Interchange unit in a digital telephone system.
- (b) Draw the circuit for reducing side tone in a telephone instrument.



- (c) List the advantages of a super-heterodyne receiver over tuned radio frequency receiver.
- (d) A radio receiver is designed with IF frequency 500 KHz. Determine the oscillator tuning range for receiving signal in the range 555 KHz to 1600 KHz.
- (e) List relative advantages and disadvantages of star and bus topology for computer communication network.
- (f) List the advantages of time division multiple access over frequency division multiple access in satellite systems.
- (g) Define these terms with respect to satellite orbit :
- (a) apogee
- (b) perigee
- (c) ascending node and
- (d) descending node.

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Contd.

- (h) List the functions of the Network Layer in OSI mode for ISDN services.
- (i) What is constituent of primary rate access for ISDN channel operating at 1.544 Mbs and 2.048Mbps ?
- (j) Determine the Doppler frequency of a RF signal at 900 MHz when received in an airplane travelling at 900 Kmph towards the transmitter. The angle of elevation is 20° .
2. (a) A telephone exchange has 10000 subscribers. Out of these 100 use the system at any point of time. Calculate the probability of blocking. Assume that each call lasts 3 minutes and each call initiation is independent of other. Assume suitable parameters for all others not specified.
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- (b) Analyze the working of a Time Space Time (T-S-T) based telephone switching network. 5
3. (a) With the aid suitable block diagram discuss the functioning of a super heterodyne receiver. Also mention the typical power levels at each stage and the gain associated with each stage. 5
- (b) A radio receiver is designed for receiving frequency range 3 MHz to 20 MH. The IF frequency is 1.8 MHz. Find the range of oscillator frequencies, range of image frequencies. Propose a receiver designed for this purpose so that image frequency can be avoided. 5
4. (a) With aid of suitable block diagram discuss the working of the communication subsystem in a communications satellite. 5

(b) An earth station for a geo-synchronous satellite system is located at latitude 27°N and longitude 37°E . The satellite is located at 25°E . Determine the angles in the spherical triangle defined by these points. Also determine the range and the look angle. 5

5. (a) Discuss the functions of the data link layer in OSI model. 3

(b) A communication network employs TDMA method of access. 500 users transmit 1000 bit packets of data. The channel bandwidth is 100 MHz and a BPSK is employed. Determine the maximum bit rate allowed per channel. What is the

packet rate ? How much time is necessary to transmit one packet from each user ? Can this system be used to transmit voice signal from each user. Derive the relationships used. 7

6. (a) Analyze different communication services supported under ISDN systems. 5

(b) Discuss the process by which data and voice are integrated and transmitted through a common channel in ISDN system. 5

7. (a) Discuss the process involved in setting up outgoing call in a cellular system. 5

(b) Analyze the effects of multipath fading and Rayleigh fading on the cellular signal. 5

8. Write notes (any *three*) : 10

(a) OSI model

(b) FM transmitters

(c) Effective Isotropic Radiated power in
satellite communication systems

(d) Digitization of voice signal for telephone
communication.
