

QP Code : 31771

(3 Hours)

[ Total Marks : 80

- N. B. : (1) Question No. 1 is compulsory.  
(2) Solve any **three** from remaining **five**.  
(3) Draw neat sketches wherever required.  
(4) Assum suitable data if required.

1. (a) What is HSDPA explain 5  
(b) Explain sensor node components with suitable diagram 5  
(c) Explain E-UTRAN with suitable diagram 5  
(d) What is RFID. Discuss the different components of RFID and explain how communication takes place among the components. 5
2. (a) Using the following data for a GSM 1800 network calculate (1) average busy hour traffic per subscriber. (2) Traffic capacity per BTS (3) required number of base stations per zone (4) The hexagonal cell radius for the zone. 10  
Subscriber usage per month = 150 minutes  
Days per month = 24  
Busy hour per day = 06  
Allocated spectrum = 4.8 MHz  
Frequency reuse plan = 4/12  
RF channel width = 200 KHz (full rate)  
Present number of subscribers in the zone = 50,000  
Subscriber growth = 5% per year  
Area of the zone = 5000 km<sup>2</sup>  
Initial installation based on a four year design  
capacity of a base station (transceiver) (BTS) = 30 Erlangs  
Traffic capacity of a GSM cell at 2% Gos (using Erlang B table) = 8.2 Erlangs.  
(b) List out the factors affecting size of the cellular network and the frequency planning. Discuss these factors in detail. 10
3. (a) Explain Bluetooth security features and security levels with proper diagrams. 10  
(b) Explain zigbee network components and network topologies. 10

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4. (a) Why TCP and UDP protocols are unsuitable for implementation in WSN. List out transport protocols designed for WSN explain any one in detail. 10
- (b) What is the key feature of SMAC explain it in detail justify its use in sensor network. 10
5. (a) Why network management design is critical issue in WSN? Give reasons. 10
- (b) What is localization of WSN nodes. Explain with examples centralized & distributed schemes in localization algorithms. 10
6. Write short notes :- 20
- (a) Middleware Architecture of WSN
- (b) IEEE 802.16 protocol Architecture
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- N.B. : 1. Question No.1 is compulsory  
2. Attempt any three from remaining  
3. Assume suitable data if necessary

1. a) Why does a satellite in highly inclined elliptical orbit spend most of its orbital period over higher latitude regions? What are the advantages and disadvantages of highly inclined orbit? 5
- b) Why LAN is placed closed to antenna of our unit? 5
- c) What are space particles? What is their impact on the satellites? The TWT has a limited life and is considered less reliable than other sub-system. Justify. 5
- d) Differentiate between window and frame organization. 5
2. a) What are the technical constraints which limit the maximum available DC power from a satellite? Draw and explain Centralized and Distributed Power sub-system 10
- b) Explain 10
- 1) Input back off and Output back off,
- 2) AM/PM conversion.
3. a) Explain T T & C subsystem. Explain the use of multi-tone frequency in tracking system. 10
- b) What are the different types of lasers used for satellite communication? Explain acquisition link model for optical communication. 10
4. a) With the help of a block diagram describe the working of transmit receive earth station used for telephone traffic. 10
- b) Explain in detail the operation of the Spade system of demand assignment. Explain what is meant by thin route service? Suggest the type of satellite access is most suitable for this service. 10
5. a) A 12 GHz receiver consists of an R.F stage with gain  $G_1 = 30$  dB and noise temperature  $T_1 = 20$  K, a down converter with gain  $G_2 = 10$  dB and noise temperature  $T_2 = 360$  K and an IF amplifier stage with gain  $G_3 = 15$  dB and noise temperature  $T_3 = 1000$  K. Calculate the effective noise temperature and noise figure of the system. Take reference temperature as 290 K. 8

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Compute the noise figure specifications of the three stages and then compute the overall noise figure from the individual noise figure specifications.

- b) How do you define an "orbital cycle" in the case of sun-synchronous orbit? 6  
What is its significance for earth observation application?
- c) What are the disadvantages of CDMA? Explain frequency hopping. 6
- 6 a) Write a note on VSAT and GPS. 8
- b) Draw and explain the satellite network architecture. 8
- c) Explain Carrier recovery circuit. 4

MAY-16

Q.P. Code : 717901

( 3 Hours)

[ Total Marks :80

- N.B. :** (1) Question No. 1 compulsory.  
 (2) Attempt any **three** questions out of remaining **five**.  
 (3) **Figures** to the **right** indicate **full** marks.  
 (4) Assume suitable data if required and mention the same in answer sheet.

1. Solve any **four**. 20
  - (a) When web pages are sent out, they are prefix by MIME headers. Why ?
  - (b) Discuss the three way handshaking in TCP for connection establishment.
  - (c) Explain Classless Inter Domain Routing (CIDR)
  - (d) Explain the use of fragmentation in Internet communication.
  - (e) Explain any one characteristics of RTP in detail.
2.
  - (a) Explain the transition states of DHCP with a neat diagram. 10
  - (b) Distinguish between OSI model and TCP/IP model. 10
3.
  - (a) Explain congestion control mechanism in TCP. 10
  - (b) Explain the different error reporting messages in ICMP with message format. 10
4.
  - (a) The following is a dump of a TCP header in hexadecimal format. 10  
 05320017 00000000 00000000 500207FF 00000000  
 (i) What is the source port number?  
 (ii) What is the destination port number?  
 (iii) What is Sequence number?  
 (iv) What is the acknowledgement number?  
 (v) What is the length of the header?  
 (vi) What is the type of the segment?  
 (vii) What is the window size?
  - (b) An ISP is granted a block of addresses starting with 190.100.0.0/16 10  
 (65,536 addresses). The ISP needs to distribute these addresses to three groups of customers as follows :  
 (a) The first group has 64 customers; each needs 256 addresses.  
 (b) The second group has 128 customers ; each needs 128 addresses.  
 (c) The third group has 128 customers ; each needs 64 addresses.  
 Design the sub blocks and find out how many addresses are still available after these allocations .

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5. (a) What is RTCP? Where it is used? Discuss different messages used in RTCP. 10  
(b) Explain in detail the architecture of H 323. 10
6. (a) What is the need of digitizing of Audio and Video in Internet communication? 10  
Explain Video Compression (MPEG) in detail. 10  
(b) Explain the resource record format of DNS.

N.B. :

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(3 Hours)

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- N.B. : (1) Question No.1 is **compulsory**.  
(2) Attempt any **Three** from the remaining **Five** questions.  
(3) Figures to right indicate **full** marks

1. (a) Explain the human speech production system with the help of a schematic representation of its physiological mechanism. 5  
(b) Explain the homomorphic processing system for convolution with a block schematic. 5  
(c) Explain basic principles of linear predictive analysis. 5  
(d) Explain dynamic "time-warping with regard to speech recognition. 5
2. (a) Why do we consider short time representation of speech signals? What do you mean by windowing? Explain the concept of short-time speech processing with suitable general block diagram. 7  
(b) A speech signal is sampled at a rate of 20000 samples/sec (20 kHz). A segment of length 1024 samples is selected and the 1024-Point FFT is computed. 8
  - (i) What is the frequency resolution (spacing in Hz) between the FFT values?
  - (ii) If the first peak in the spectrum occurs at 15th to sample, what is the pitch frequency? Hence, find out the period of one glottal cycle.
- (c) Define threshold of hearing, intensity level of sound, and sound pressure level (SPL). Give the typical dB values of SPL for threshold of hearing, noisy restaurant, and jet engine. 5
3. (a) Write a note on spectrographic analysis of speech signal. What are the typical values of parameters (e.g. window duration, FFT length, and window shift) for wideband and narrowband spectrograms? Give the reasoning for the same. 7  
(b) With the help of neat block diagram, explain the working of clipping auto correlator. What are the advantages of using three level clipper? 8  
(c) Explain the US federal standard 1016 using CELP. 5

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- 4 (a) Draw a diagram of the vowel triangle, giving the approximate positions of the basic English vowels. 5
- (b) Explain various possible information rates for speech signal with reference to its parametric and waveform representation. 5
- (c) Explain Levinson-Durbin algorithm for calculation of prediction coefficients. 10
5. (a) Explain the production of English vowels and diphthongs. 5
- (b) What is MFCC? Explain the method to calculate MFCC using block diagram. 5
- (c) What is multi-pulse excitation? How is the multi-pulse excitation superior to the CELP coder? 10
6. (a) Draw a diagram of a lattice structure for an all-pole filter and explain it. 5
- (b) What are the problems with speech recognition system? 5
- (c) Explain an LPC based synthesizer using a block schematic. What is the assumption used in the synthesis? 10



- N.B.:** (1) Question no. 1 is compulsory.  
(2) Answer any 3 questions from remaining five questions.  
(3) Assume suitable data if required and justify the same.  
(4) Figures to the right indicate full marks.

1. (a) Explain center frequency and fractional bandwidth that separate UWB from conventional narrowband systems. 5  
(b) Discuss methods of interference mitigation of UWB with WLAN 802.11.a 5  
(c) Explain how code sense technique replaces ARQ techniques in MAC layer of IEEE802.15.3a 5  
(d) What are sources of error in GPS based positioning. 5
  2. (a) Explain two ray propagation model for UWB signals. 10  
(b) Discuss time hopping PPM based UWB systems. 10
  3. (a) What are prolate spheroidal functions? Why are they attractive for UWB communications? 10  
(b) Explain any two network based positioning techniques. 10
  4. (a) Explain multiband OFDM UWB proposal for standardization. 10  
(b) Compare and contrast UWB communication system performance with direct sequence spread spectrum and frequency hopped spread spectrum on basis of SNR and BER for single and multiple users. 10
  5. An UWB signal has center frequency of 6 GHz and bandwidth of 2GHz operates beam former having ten elements, element spacing of  $d = 4c/f_c$ ,  $\theta_0 = 10$  degrees. Calculate INBW as a function of frequency. Compute first two grating lobes for each side of main lobe for 5GHz, 6GHz and 7GHz. 20
  6. (a) Explain wavelet packets in UWB PSM. 10  
(b) Generation, transmission and reception of UWB waveforms is less natural than sinusoids. Justify. 5  
(c) Discuss free space path loss model. Modify the same for UWB application. 5
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