

M.E. / Sem I (CBSSGS) / EXT

NOV / DEC '16

FIBER  
OPTICAL Comm. ~~Network~~

QP CODE : 666101

(3 Hours)

TOTAL MARKS: 80

**NB: (1) Question No.1 is COMPULSORY**

**(2) Attempt any three questions from remaining questions**

**(3) Figures to the right indicate full marks**

1. (a) Compare DSF and NZDSF 5  
(b) Explain Optical Pumping 5  
(c) Describe Self-Phase Modulation 5  
(d) Explain Network Topologies 5
  2. (a) Derive waveguide equation for an optical fiber 10  
(b) Discuss in detail splicing techniques 10
  3. (a) What are Quantum Well Lasers discuss in detail 10  
(b) Describe Resonant Cavity Enhancement (RCE) Photodetector 10
  4. (a) Discuss working principle of EDFA in detail 10  
(b) Explain working of Optical Modulator 10
  5. (a) Explain any two Fiber Fabrication Techniques 10  
(b) Discuss different types of nonlinearities in optical fiber communication 10
  6. Write short notes on 20
    - (a) SONET/SDH
    - (b) DWDM networks
    - (c) Photonic Crystal Fibers
    - (d) Bio photonics
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## DIGITAL SIGNAL PROCESSING &amp; ITS APPLICATION

Q. P. Code : 666200

(3 hours)

Marks: 80

Note the following instructions.

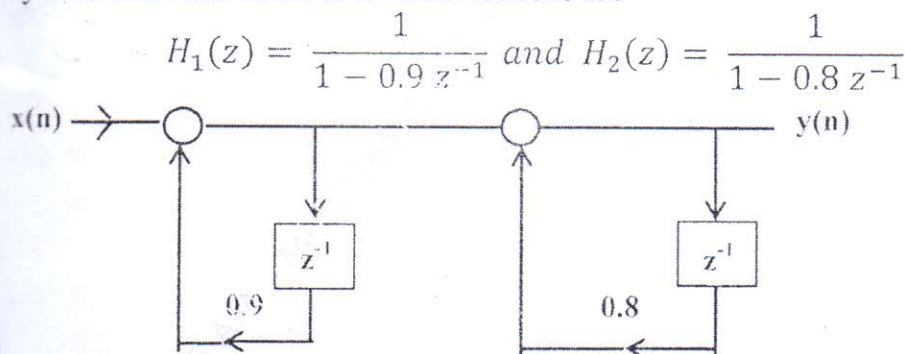
- (1) Attempt any four questions
- (2) Assume suitable data wherever necessary, justify the same
- (3) Figures to the right indicate full marks.

- 1.a Explain in brief real time DSP system [5]
- 1.b What is the need for multirate signal processing? Give one example of multirate digital system [5]
- 1.c Explain very long instruction word (VLIW) architecture used for P-DSPs [5]
- 1.d If  $x(n)$  and  $X(k)$  are DFT pairs then show that [5]

$$\sum_{n=0}^{N-1} |x(n)|^2 = \frac{1}{N} \sum_{k=0}^{N-1} |X(k)|^2$$

- 2.a For a discrete time sequence  $x(n) = \{1, 1, 1, 1, 1, 1, 1, 1\}$ , find out 8 point DFT using DIT-FFT algorithm and also plot magnitude and phase response. [10]

- 2.b A cascade realisation of the two first order digital filter is shown below. The system functions of the individual sections are [10]



Draw product quantisation noise model of the system and determine the overall output noise power

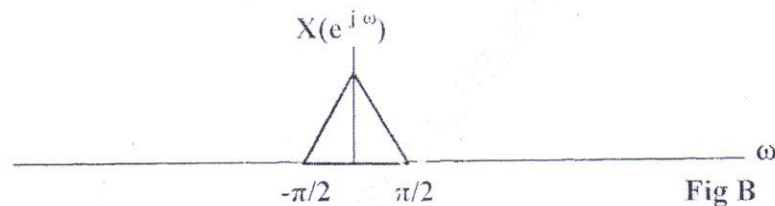
- 3.a Design a band pass FIR filter for the following specifications [10]
- Cutoff frequencies = 400 Hz to 800 Hz
- Sampling frequencies = 2000 Hz
- Filter length = 11
- Use rectangular window

TURN OVER

- 3.b Design a IIR digital Butterworth filter to satisfy the constraints [10]  
 $0.707 \leq |H(e^{j\omega})| \leq 1 \quad 0 \leq \omega \leq 0.5\pi$  and  
 $|H(e^{j\omega})| \leq 0.2 \quad 0.75\pi \leq |\omega| \leq \pi$   
 With  $T = 1$  sec. Apply Bilinear transformation.

- 4.a Implement a two stage decimator for the following specifications [12]  
 Sampling Frequency = 20 KHz  
 Decimation factor 'D'=100  
 Passband = 0 Hz to 40 Hz  
 Transitionband = 40 Hz to 50 Hz  
 Passband ripple = 0.02  
 Stopband ripple = 0.002

- 4.b The spectrum of discrete time signal is as shown in figure B. Sketch the spectrum of [8]  
 i. Upsampled or Interpolated signal for  $L = 2$



- 5.a Define periodogram and explain how DFT and FFT are useful in power spectral estimation [8]  
 5.b What are limitation of non-parametric methods in spectral estimation [6]  
 5.c Discuss power spectrum estimation using parametric method [6]  
 6. Write short notes on any Four [20]  
 i. Audio applications of DSP  
 ii. Telecommunication applications of DSP  
 iii. Biomedical applications of DSP  
 iv. General purpose digital signal processors  
 v. Polyphase implementation of Decimator and Interpolator  
 vi. Effect of finite word length in digital filters



## Advanced Satellite Communication

[3 Hours]

[Total Marks : 80]

- Note:** (1) Question no 1 is compulsory  
 (2) Attempt any three from remaining questions  
 (3) Assume suitable data if necessary

1. Answer the following:

- (a) Explain different services rendered by satellite? **05**  
 (b) Explain Advantages and disadvantages of Satellite communication **05**  
 (c) It is preferable to use circular polarization for satellite communication. Give reasons. **05**  
 (d) Why double reflector antennas are preferred for satellite communication. **05**

2. (a) Explain the following with necessary diagrams. **10**

- (i) Right ascension of Ascending node.  
 (ii) Argument of perigee.

(b) Explain Earth eclipse of satellite and sun transit outages. **10**3. (a) What is Telemetry Tracking command (TT & C)? Explain the functioning of each block with diagram. **12**(b) What is AOCS? Discuss different stabilization techniques. **08**4. (a) With necessary diagram explain Double conversion transponder? **12**(b) Why Travelling Wave tube is preferred in Satellites? Explain 1dB compression point. **08**5. (a) A Satellite signal occupies a bandwidth of 36M Hz and provides a C/N ratio of 22dB at earth station. If total losses are 200dB and earth station G/T is 31 dB/k. calculate satellite EIRP required in dBW and in KW. **10**(b) What are various types of repeaters used in satellite communication? Explain Any one in detail. **10**6. Write short note on Following (any two) **20**

- (a) Cassegrain antenna and Gregorian antenna.  
 (b) Reliability and bath tub curve and space qualification.  
 (c) Transmit receive earth station.

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Q.P. Code : 667000

(3 Hours)

Total Marks : 80

- Note :** 1) Question No 1 is compulsory  
 2) Solve **any three** out of remaining questions  
 3) **Figure** to the **right** indicate **full marks**

1. Attempt any four questions. 20
  - a) How NGN differs from internet. 5
  - b) Define NGN? What are the key features of NGN? 5
  - c) Justify, heterogeneity of the infrastructure, growing competition and falling call sales are the primary threat to the telecom industry. 5
  - d) What is the impact of using IPv6 to NGN? 5
2. a) How transition takes place from IP network to All IP networks? Explain the co-existence of different networks. 10
- b) How NGN influences on overall economic growth? 10
3. a) Explain the various naming, numbering and addressing scheme in NGN. 10
- b) What are the ID's used in TISPAN NGN? How NGN ID's are administered? 10
4. a) Write a note on control and signaling protocol for NGN. 10
- b) How are NGN QoS classified? What are the factors affecting the classes of service? 10
5. a) Explain Location Based Services (LBS) and Content Based Services (CBS)? 10
- b) How IP-based networks are classified? Compare IPv4 and IPv6 based NGN. 10
6. Attempt any two 20
  - a) Fixed Mobile Convergence in NGN
  - b) NGN Evolution
  - c) Explain mobile IPTV service with challenges and application
  - d) IP Multimedia Subsystem for NGN