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BIELE-014

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

00008

December, 2015

BIELE-014 : MULTIRATE SYSTEMS

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any* ***seven*** *questions. All questions carry equal marks. Missing data, if any, may be suitably assumed. Use of scientific calculator is permitted.*

1. Discuss in detail the multirate operation of up sampling and down sampling. Also differentiate between time-domain and frequency-domain analysis. *5+5=10*

2. Explain the various identities of multirate operations. Also prove them. *10*

3. With the help of a neatly labelled block diagram, give the polyphase representation of a decimated uniform Discrete Fourier Transform (DFT) filter bank. *10*

4. List the methods involved in the cancellation of aliasing errors, amplitude distortion and phase distortion of a Quadrature Mirror Filter Bank. *10*

5. What are the conditions required for perfect reconstruction of a QMF bank ? List the steps involved in the design of an alias-free QMF bank. *10*

6. Explain in brief the errors created by filter banks with unequal pass bandwidth. How can the above errors be minimized ? Explain. *10*

7. What are Finite Impulse Response Perfect Reconstruction (FIR PR) systems ? How are such systems helpful in the factorization of polyphase matrices ? *5+5=10*

8. What are the necessary conditions for linear phase property ? Give the lattice structure for LPPR FIR QMF bank. *4+6=10*

9. List the steps involved in the synthesis of an M-channel LPPR filter bank. Give an example to support your answer. *10*

10. Write short technical notes on any ***two*** of the following : *2×5=10*

    (a) Design of Decimator

    (b) Uniform DFT Filter Bank

    (c) Aliasing and Imaging

    (d) Dynamic Range and Scaling
