

- www.FirstRanker.com** **www.FirstRanker.com**
- Q.3** (a) Explain briefly application of Goertzel algorithm. **03**
 (b) Determine r_{xx} & r_{xy} for following sequences: **04**
 $x(n) = \{1, 2, 1, 1\}$ & $y(n) = \{1, 1, 2, 1\}$
 (c) Given $x(n) = 2^n$ and $N = 8$, find $X(k)$ using DIT FFT algorithm. **07**
- Q.4** (a) Explain in brief the Cascade representation of Digital IIR system **03**
 giving one example.
 (b) Develop Direct form – I realization of following system: **04**

$$H(Z) = \frac{0.28z^2 + 0.319z + 0.04}{0.5z^3 + 0.3z^2 + 0.17z - 0.2}$$

 (c) Design and FIR digital filter to approximate an ideal low pass filter **07**
 with pass band gain of unity, cut off frequency of 850Hz and working
 at sampling frequency of $f_s = 500\text{Hz}$. The length of impulse response
 should be 5. Use rectangular window function
OR
- Q.4** (a) Explain Parallel realization of digital system giving suitable example. **03**
 (b) Obtain Direct form – II realization of following system **04**

$$H(Z) = \frac{0.56z^{-1} + 0.638z^{-2} + 0.08z^{-3}}{1 + 0.6z^{-1} + 0.34z^{-2} - 0.4z^{-3}}$$

 (c) Convert the analog filter with system function **07**

$$H(s) = \frac{s + 0.1}{(s + 1)^2 + 9}$$

 into a digital IIR filter using bilinear transformation. The digital filter
 should have a resonant frequency of $\omega_r = \frac{\pi}{4}$
- Q.5** (a) Differentiate Analog filter and Digital Filter **03**
 (b) Explain briefly analysis of Cardiac Variability in context on signal **04**
 processing.
 (c) Explain IIR filter design using Bilinear Z – Transform method. Also **07**
 prove the transformation process stability.
OR
- Q.5** (a) Explain how Laplace transform and Z – transform are related by their **03**
 poles plot diagram?
 (b) Explain briefly the fundamentals approach for detection of QRS **04**
 complex wave from ECG signal using signal processing.
 (c) Explain IIR filter design using (i) Approximation of derivatives and **07**
 (ii) Impulse Invariance method.
