

## UNIT WISE QUESTION BANK

| S NO | Short Answer Questions                                                                                    | Blooms Taxonomy Level | Course Outcome |
|------|-----------------------------------------------------------------------------------------------------------|-----------------------|----------------|
|      |                                                                                                           |                       |                |
|      | <b>UNIT II</b>                                                                                            |                       |                |
|      | <b>Fourier series:</b>                                                                                    |                       |                |
| 1.   | What are Dirichlet's conditions for Fourier series? State them.                                           | Knowledge             | 2              |
| 2.   | What are the types of Fourier series?                                                                     | Understand            | 2              |
| 3.   | What is trigonometric Fourier series and write their Coefficients?                                        | Understand            | 2              |
| 4.   | What is exponential Fourier series and write their coefficients equations?                                | Understand            | 2              |
| 5.   | Write alternative form of the Trigonometric Fourier series and its coefficients equations                 | Understand            | 2              |
| 6.   | How do you obtain trigonometric Fourier series coefficients from exponential Fourier series Coefficients? | Understand            | 2              |
| 7.   | How do you obtain exponential Fourier series coefficients from trigonometric Fourier series Coefficients? | Understand            | 2              |
| 8.   | How do you obtain cosine Fourier series from Exponential Fourier series coefficients?                     | Understand            | 2              |
| 9.   | What is the Fourier Spectrum                                                                              | Understand            | 2              |
| 10.  | What do you mean by Gibbs phenomenon?                                                                     | Understand            | 2              |
| 11.  | Write down the exponential form of the Fourier series Representation of a Periodic signal?                | Understand            | 2              |
| 12.  | Write down the trigonometric form of the Fourier Series representation of a Periodic signal?              | Apply                 | 2              |
| 13.  | State Time Shifting property in relation to series.                                                       | Apply                 | 2              |
|      | <b>Fourier transform</b>                                                                                  |                       |                |
| 14.  | What is the use of Fourier transform?                                                                     | Knowledge             | 2              |
| 15.  | What are the merits of Fourier transform?                                                                 | Knowledge             | 2              |
| 16.  | What are the limitations of Fourier transform?                                                            | Knowledge             | 2              |
| 17.  | What are the differences between the Fourier series and the Fourier transform?                            | Understand            | 2              |
| 18.  | What are Dirichlet's conditions for Fourier transform? State them                                         | Apply                 | 2              |
| 19.  | Define Fourier transform pair.                                                                            | Knowledge             | 2              |
| 20.  | State Convolution property of Fourier Transform.                                                          | Apply                 | 2              |
| 21.  | Write and explain Time Reversal Property of Fourier Transform.                                            | Apply                 | 2              |
| 22.  | Find the Fourier transform of $x(t)=\sin(\omega t)$                                                       | Understand            | 2              |
| 23.  | What is the effect of Hilbert transform?                                                                  | Apply                 | 2              |
|      | <b>Long Answer Questions</b>                                                                              |                       |                |
| 1    | Write the Dirichlet's conditions to obtain Fourier series representation of any signal.                   | Understand            |                |
| 2    | Derive the expression for trigonometric Fourier series                                                    | Understand            | 2              |

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|    | and<br>derive the Fourier Co-efficient's                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |   |
| 3  | Find the trigonometric Fourier series for half wave rectified sine wave.                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Understand | 2 |
| 4  | Find the cosine Fourier series for the waveform shown in Figure                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Understand | 2 |
| 5  | Obtain the exponential Fourier series for the waveform shown in Figure Also draw the frequency spectrum.                                                                                                                                                                                                                                                                                                                                                                                                                            | Understand | 2 |
| 6  | Determine the fourier series expansion of the square wave function as<br>$f(t) = 1 \quad -1/2 < t < 1/2$ $-1, \quad 1/2 < t < 3/2$                                                                                                                                                                                                                                                                                                                                                                                                  | Understand | 2 |
| 7  | Find the exponential fourier series for the full wave rectified sine wave for the interval $(0, 2\pi)$ with an amplitude of 'A'                                                                                                                                                                                                                                                                                                                                                                                                     | Understand | 2 |
| 8  | state and prove the following properties of Fourier series<br>a) Linearity property                      b) Time shifting property<br>c) Time Reversal Property                  d) Time scaling Property<br>e) Time differentiation Property          f) Time integration Property<br>g) Convolution theorem                      h) Multiplication property<br>i) Parseval' theorem                                                                                                                                               | Apply      | 2 |
| 9  | Derive the polar fourier series from the exponential fourier series representation and hence prove that $D_n = 2  C_n $                                                                                                                                                                                                                                                                                                                                                                                                             | Understand | 2 |
| 10 | Write a short note on exponential fourier spectrum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Understand | 2 |
|    | <b>Fourier Transforms</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |   |
| 11 | Distinguish between the exponential form of the Fourier series and Fourier transform. What is the nature of the 'transform pair' in the above two cases                                                                                                                                                                                                                                                                                                                                                                             | Understand | 2 |
| 12 | What is Fourier Transform of signum function?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Understand | 2 |
| 13 | What is Fourier Transform of Rectangular function?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Understand | 2 |
| 14 | Find the Fourier transforms of<br>a) $\cos wt u(t)$ b) $\sin wt u(t)$ c) $\cos (wt + \phi)$ d) $\sin (wt + \phi)$                                                                                                                                                                                                                                                                                                                                                                                                                   | Apply      | 2 |
| 15 | Find the Fourier transform of standard signals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Understand | 2 |
| 16 | write and Explain the properties of Fourier transform<br>a) Time scaling                                  b) Time differential<br>c) Time integral                                  d) Linearity property<br>e) Time shifting property                      f) Frequency shifting property<br>g) Time reversal property                      h) Frequency differentiation<br>i) convolution property                          j) Multiplication property<br>k) Duality property                              l) Modulation property | Understand | 2 |

|    |                                                                                                                                                                                                          |           |   |
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|    | m)conjugation property                                                                                                                                                                                   |           |   |
| 17 | Find the Fourier transform of the following<br>a) real exponential, $x(t) = e^{-at} u(t)$ , $a>0$<br>b) rectangular pulse, $x(t) = 1$ , $-T < t < T$<br>$0$ , otherwise<br>$x(t) = e^{at} u(-t)$ , $a>0$ | Apply     | 2 |
| 18 | a) Find the Fourier transform of a gate function $x(t) = 1$ , $ t  < 1/2$<br>$0$ , $ t  > 1/2$<br>Find the Fourier transform of $x(t)=1$                                                                 | Knowledge | 2 |